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"Youngstown Plan" Lowers Range Installation Cost

IN ONE *Self Contained* INSTRUMENT

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sensitivity 20,000 ohms per volt—1.5 to 1500 volts

10
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12
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readings from 1 microampere to 15 amperes

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July 1, 1939

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But You Ought to See the Other Fellow

A utility executive, while admitting that one cannot stand still without slipping backward and that gloomy publicity must give way to cheerfulness, insisted that one must face facts and not be misled by the appearance of optimism. He was right. One should not "kid" oneself, but it is barely possible that in trying not to mislead oneself one might overlook some things that would make the situation look different. So, let us examine the facts.

General business has not yet reached the peak of 1929. Electric utilities' output and gross have long since passed the 1929 figures.

Utility bonds, in spite of all the new regulation and taxes, are selling at the lowest yield in all time. Refinancing has been done at a record low cost for money.

After government expenditure of hundreds of millions of dollars to build competing systems and after millions in gifts to cities to destroy private ownership, the Administration has not been able to make more than a very small dent in the total. And now the public is swinging strongly toward private ownership.

Operating companies have not gone in the red, while the contrary was true of a great many other businesses last year.

Now these facts are not cited as an indication that all is well with the utility industry, for such is not the case by any manner of means. They do show, however, that the utility industry, in spite of all its grief, has fared better than general business during the past decade. In spite of all the laws, regulations and taxes and pro-public ownership propaganda financed from the public treasury, the electric utilities have come through better than companies in non-regulated fields.

As a matter of fact, the utilities generally have not been badly hurt. They have complained that they could not get equity money for expansion. But who *has* been able to sell stock? The market for stocks is down below prices at which companies would be willing to issue new stock. When it comes back to levels more truly representative of value, it will be possible to sell new stock—utilities along with everybody else.

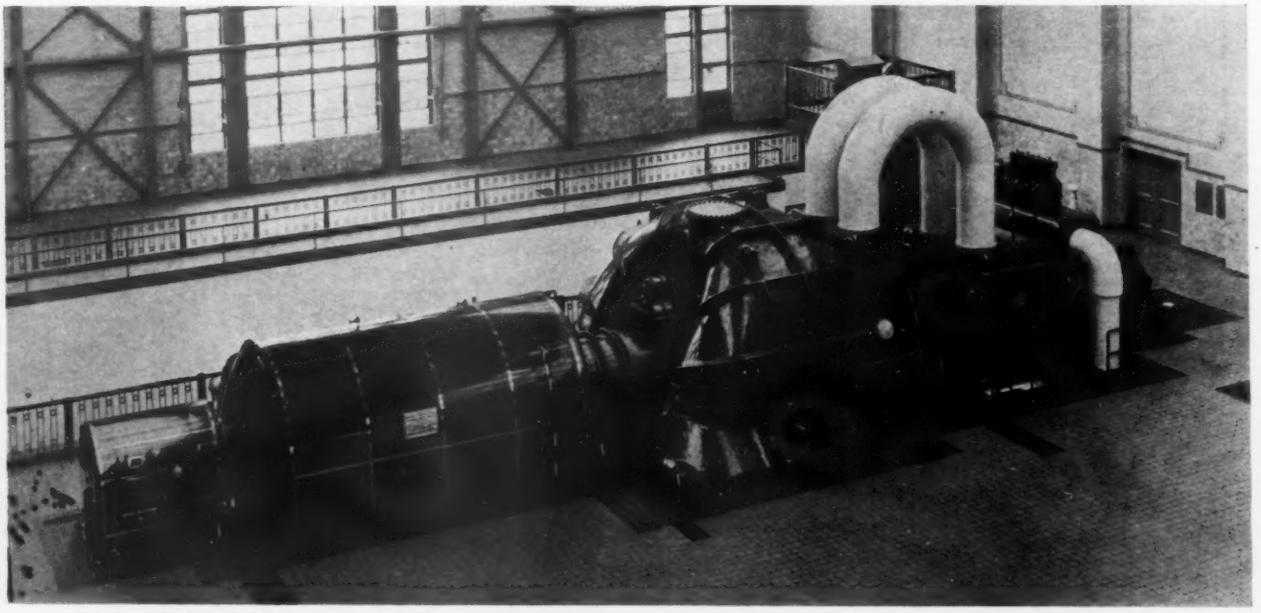
One may have his doubts about recovery or business improvement so long as the present fiscal and social-economic policy of the government continues. That doubt, however, would apply equally to all businesses and it concerns the economy of the entire country. If one is not to let his business go by default, he must strive to build, and in so doing the only guide he has as to whether or not he is successful lies in comparison, both with others in the same business and with other businesses. So long as the electric utilities can manage to do better than other businesses conditions assuredly could be worse.

So far the public has gradually come to think that the utilities have been treated too harshly and public sympathies have swung around to private ownership. It won't be long, however, before the public begins to sense the strength of the utility business. It might not be a bad idea for the industry to be the first to tell the public forcefully about the stability of the utility business.

Let's be like the little boy who came home with an eye closed, a bloody nose and his clothes torn, but nevertheless proudly said, "But you ought to see the other fellow!" That's the kind of fighting spirit the public likes.

ADDITIONAL CAPACITY

C. W. De FOREST, *Vice-President Columbia Engineering Corporation*



New 65,000-kw. unit at Columbia will operate separately under normal conditions

COLUMBIA STATION is located on the Ohio River, 20 miles downstream from Cincinnati. It is operated as the base load station for the Cincinnati area, in conjunction with the West End station, located in Cincinnati, and also owned by the Cincinnati Gas & Electric Company. The original installation of two 45,000-kw. units was completed in January, 1926. During 1928 and 1929 extensive alterations were made and the capacity was raised to a total of 130,000 kw., in two 65,000-kw. cross-compound units.

A new unit which was placed in service in the fall of the past year is also of 65,000 kw. capacity, but is a straight-through single-shaft machine; the old units are cross-compound type and employ reheat. The old boiler plant comprises six standard boiler units and two reheat units; steam is supplied to the turbines at 600 lb. and 72 deg. F. total temperature. Necessity for reheat is avoided in the new plant by using steam at 900 deg. F. and 675 lb., supplied by two 350,000-lb.-per-hour continuous slag tap boilers. Normally, No. 3 turbine will be operated separately from the remainder of the station, but steam and feedwater cross-connections are provided, so that if desired the new boilers may be used to supply the old turbines, through a desuperheater, or the old boilers may feed the new turbine, at subnormal throttle conditions. An unusual feature of the cross-connections is a feedwater balance control system which continuously and automatically maintains condensate exchange between the new and old units, the same as the steam exchange.

The new boilers are provided with direct system of pulverized fuel firing. Each boiler has four burners, supplied by two pulverizer units; burners are located in the furnace roof and are inclined at 14 deg. to the vertical. The boilers may be described as four-pass. Gases leave the furnace at the lower part of the rear wall, traverse two "open radiant" passes and enter the bottom of the "convection" pass. This pass is provided with a baffle, so located as to divide the area on a 30 and 70 per cent basis. Economizer sections only are located in the 30 per cent "by-pass" section. Superheater sections are located at the bottom of the 70 per cent "main" section; economizer sections are above. The heating surface in the furnace and in the two open passes was proportioned so as to bring the gases entering the superheater below the fusing temperature of the slag. Superheat temperature is controlled by manually operated dampers over the two sections. A tubular type air heater is located above the convection pass. The floor area occupied by the new boiler plant is only 20 per cent of that taken by the old plant, although the capacity is 50 per cent of it.

Bailey combustion control equipment, Smoot & Bailey feedwater controls, pressure and draft gauges,

IN COLUMBIA STATION

Steam temperature and pressure raised for new single-shaft, hydrogen-cooled, 65,000-kw. turbo-generator — Protection against high river stage required condenser well 70 ft. deep and a unique method of turbine support, as well as flood-proofing provisions through entire building structure and equipment

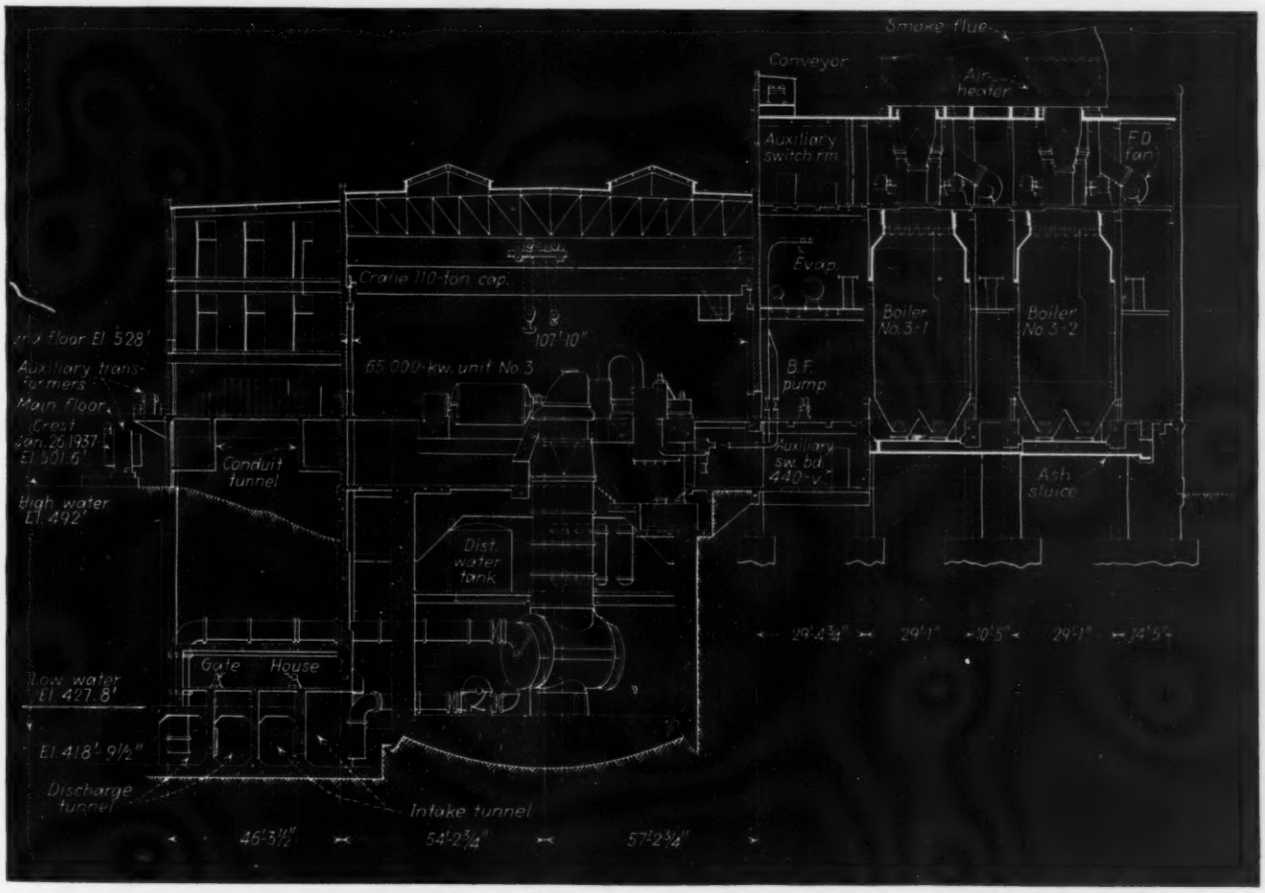
temperature recorders, etc., for boiler control are centralized in two large control boards on the boiler operating gallery, located about 30 ft. above the turbine room floor. Control switches and instruments for the fans, mills, blowers and ignition equipment are also mounted on these control boards. Control for all electrical auxiliaries is interlocked so that the proper operating sequence must be followed.

Coal is delivered to bunkers by a belt conveyor system fed from the present conveyors in the old plant. It is now desirable to handle and store separately two kinds of coal, since the new slag-tap furnaces function easier with a medium low-fusion ash, and the old boilers, equipped with dry bottom refractory furnaces, require a high-fusion ash. Slag ash and economizer hopper dust are sluiced to the ash house of the old plant, from which the ash may either be pumped to fill around the plant or loaded into cars by a bucket crane. Fly ash is not yet a problem, since the plant is located in a sparsely populated rural region.

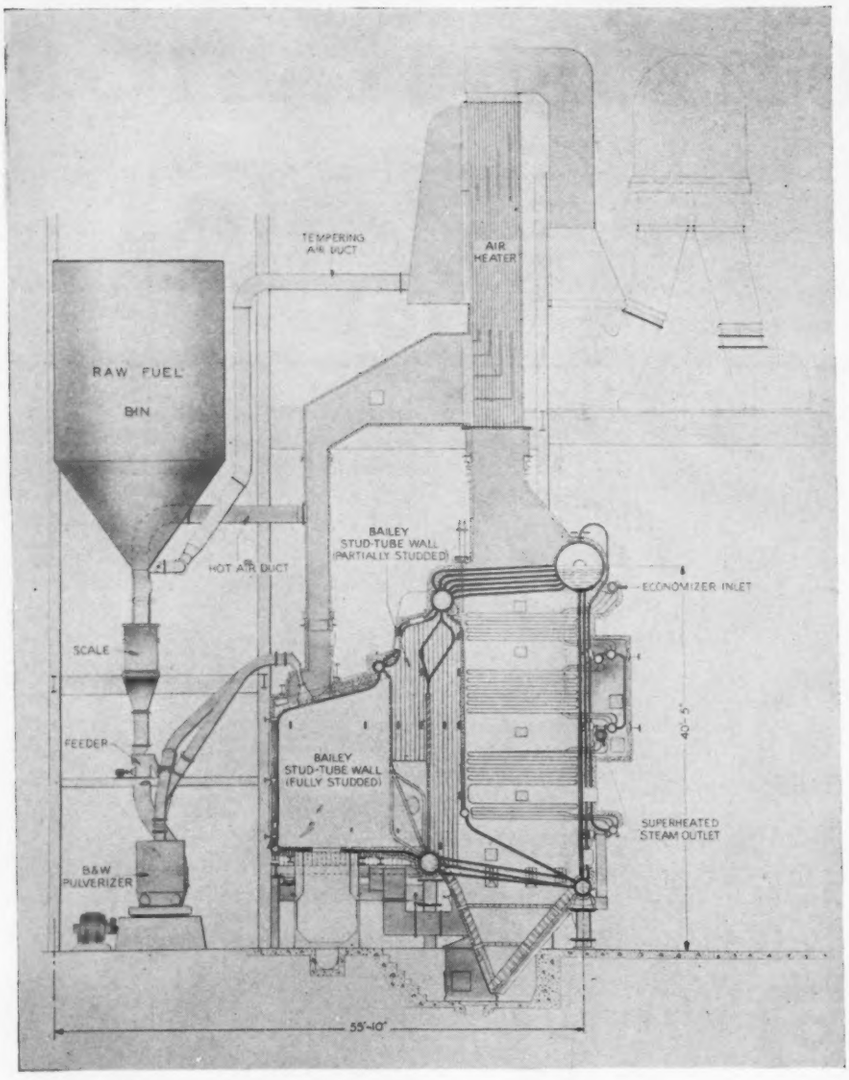
The entire coal-handling system is equipped with an automatic sprinkler fire protection system.

The feedwater system of the new plant is a completely closed one. Condensate, after leaving the air ejector condenser, passes through four low-pressure closed heaters (of which three are extraction heaters and one is the evaporator condenser) and enters the boiler feed pump suction header at about 300 deg. F. Three motor-driven boiler feed pumps are installed; two are sufficient to supply both boilers at full rating. From the feed pump discharge header feedwater passes through one high-pressure extraction heater, located on the boiler operating floor level, and enters the economizers at about 350 deg. F.

Two single-effect evaporators for makeup, together with their control panel, are also located on the boiler



A 70-ft. condenser well required unusual engineering for the turbine installation



Each 350,000-lb./hr. boiler is directly fed from four burners

operating floor level. Each boiler is provided with one forced and one induced draft fan. Forced draft fans have single motors and induced draft fans have a low-speed and a high-speed motor. The high-speed motor is required to obtain full boiler rating. The low-speed motor allows a maximum output of about 225,000 lb. per hour per boiler.

Hydrogen-Cooled Generator

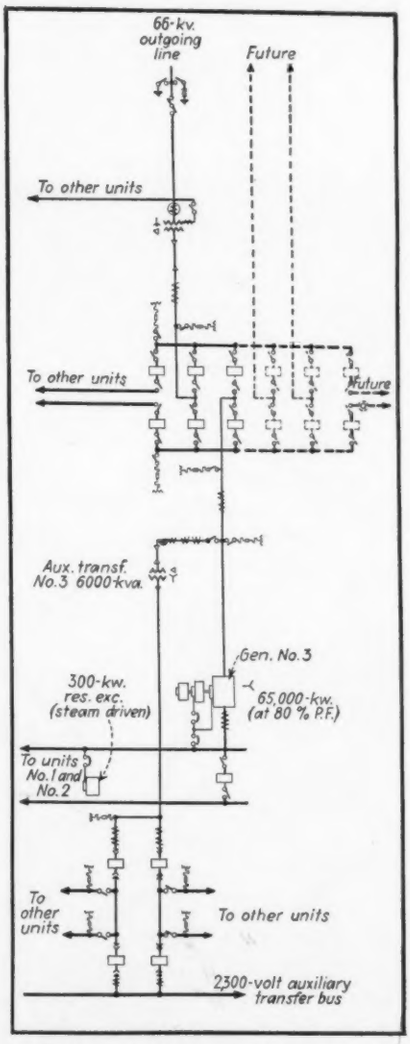
The 65,000-kw. turbo-generator unit is a tandem-compound condensing machine operating at 1,800 r.p.m. The high-pressure turbine unit is of "double-shell" construction, generator is hydrogen cooled and the hydrogen system control panel is located beside the main control panel for the machine.

Condenser is a two-pass surface type, with 51,800 sq.ft. of cooling surface, and is supported on a deaerating type hotwell. The entire condenser shell is of welded steel plate construction.

As is necessary in most Ohio Valley plants, the condenser is located considerably below the turbine because of the wide variation in river level. At Columbia the condenser well floor is 78 ft. 6 in. below the turbine room floor. The condenser is connected to the turbine exhaust by a welded steel stack 16 ft. in diameter and 44 ft. 6 in. long, provided with a rubber-gasketed, water-sealed expansion joint. In the old plant condenser shells and stacks are made of cast iron.

The reinforced concrete condenser "well" and the turbine support presented interesting engineering problems and they are unique features of the station. The "well" is 70 ft. in diameter inside, with walls 6 ft. thick. Depth from the top to the pit floor is 60 ft. 6 in. The bottom of the well is 15 ft. thick at the center, this mass being necessary to prevent flotation in case of high water. Unit No. 3 is located over the south half of the well. Future unit No. 4 will occupy the north half. The north portion of unit No. 3 foundation is a concrete beam 80 ft. 7½ in. long over all, 26 ft. deep at the center and 3 ft. 6 in. wide. The main reinforcing consists of fifteen 2½-in. square bars which were adjusted to proper position during erection by means of turnbuckles.

Pulverizer mills and blowers, forced and induced draft fans, boiler feed pumps, circulating water pumps, hotwell pumps and service pumps are all driven by 2,300-volt motors supplied from a metal-clad oil circuit breaker bus and switch structure. This bus has two sources of power: (1) a 6,000-kva., 13,200/2,300-volt, three-phase outdoor transformer connected directly to the leads of unit No. 3 without the intervention of a circuit breaker. This transformer is



Main connections for unit No. 3 at Columbia station

used as the normal source; (2) a tie connection to the existing 2,300-volt transfer bus. This tie is used as the emergency source.

The remaining auxiliaries are driven by 440-volt motors supplied from a self-supporting, dead-front air circuit breaker switchboard. This bus is supplied from two 450-kva., 2,400-240/480-volt outdoor transformer banks, each consisting of three 150-kva., single-phase transformers. Either bank will carry the entire bus load.

Varnished cambric insulated cable with a lead sheath and bronze interlocking armor is used for all power and control circuits. In addition, the control and small power cables in the boiler room are insulated with asbestos and varnished cambric. The major runs of power and control cable are carried in steel cable pans. Leads of the new generator consist of four ¼x6-in. copper bars per phase and are carried in an aluminum inclosure from the generator terminal to the switch structure.

Flood Protection Essential

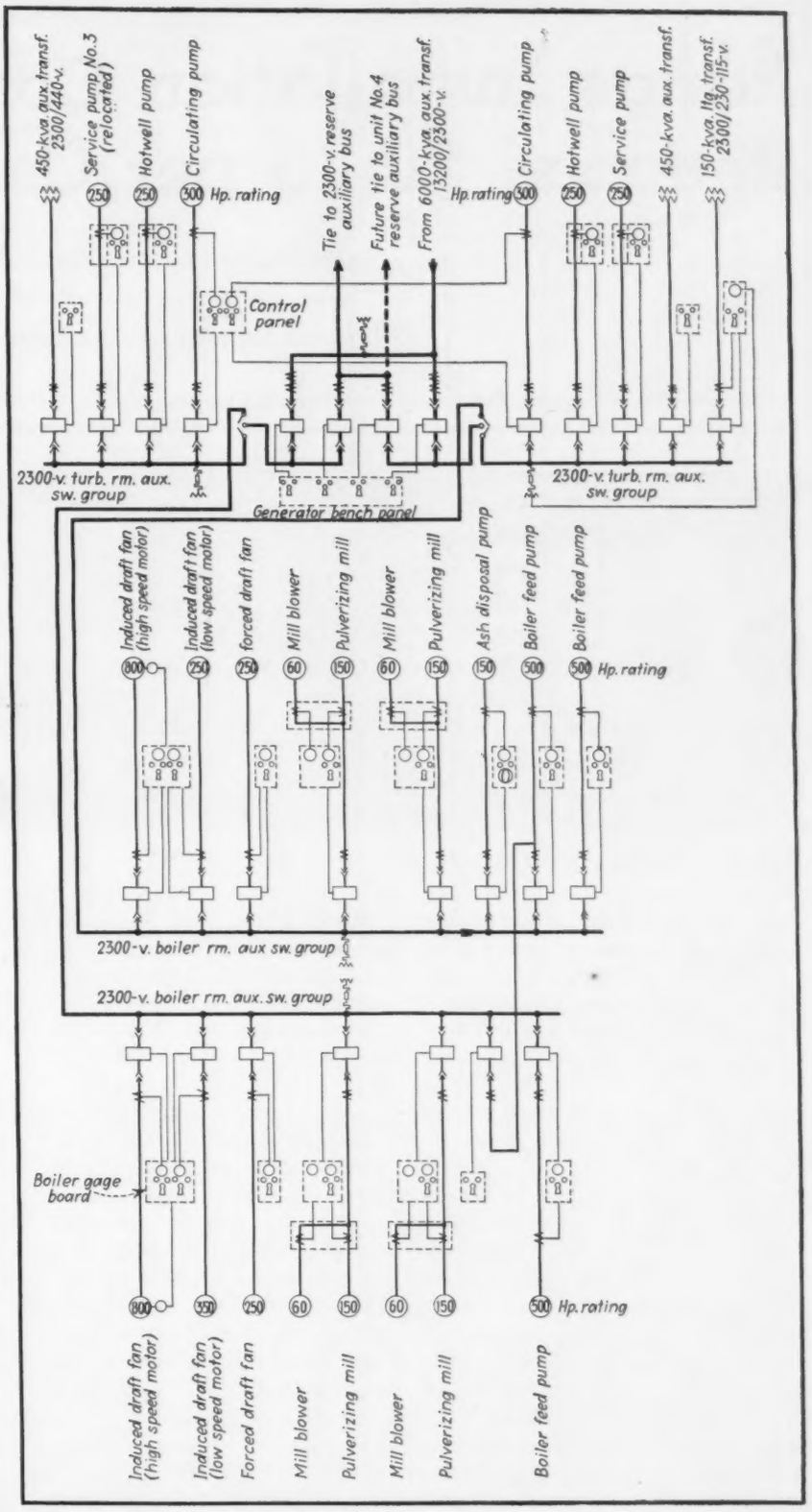
The station as originally laid out provided a separate 13,200-volt bus section for each unit with a main and reserve bus for each section. Main and reserve buses are on separate floors with horizontal phase isolation for each bus. Each bus section is in a separate room to minimize damage in case of explosion of fire. In extending the switching galleries for unit No. 3 the original plan was followed except that the concrete bus and switch structures were built of "Haydite" concrete (aggregate replaced by burnt shale) to reduce their weight. Provision was made for No. 4 bus section, although no bus and switch structures were built in this portion.

All copper bar connections in the bus and switch structures for No. 3 unit, as well as those in the generator leads, are silver plated at the joints and splices.

All circuit breakers, disconnect switches and bus supports in the bus and switch structures are protected by a flash or ground fault bus.

An unusual feature of Columbia station is the flood protection work, recently completed. The station was shut down by the disastrous Ohio River valley flood of January, 1937, during which floodwater reached a level of nearly 9 ft. above the plant basement floor. By means of an elaborate system of floor reinforcing, flood walls and steel bulkhead doors and windows a reliable capacity of 126,000 kw. is now assured from the old section of the station to a flood level 6 ft. above the basement floor. It was found impractical to protect the entire old section to the extreme elevation of the 1937 flood. However, only the old section ashpits, ash-removal system and a portion of the pulverizer house will be flooded when water exceeds 6 ft. above the basement floor.

[*Continued on page 90*]



Layout for 2,300-volt auxiliary drives

Range Installation Costs Reduced 20-30 per Cent

Ohio Edison's "Youngstown Plan" of enlisting contractors in mass production methods of range installation upholds wiring standards, enhances contractor good will and pleases customers

P. M. GEARY, *Manager Steel City Installation Company, Youngstown, Ohio*

Three of Youngstown's special trucks for range-wiring jobs

A LITTLE MORE than a year ago the Youngstown division of Ohio Edison Company, in co-operation with the Electrical Contractors' Association of Youngstown, developed a new method of taking care of range installations which has resulted in lower costs of range wiring installations in a manner that is economically sound. It gives the utility company's customers prompt installation service. It is convenient and has improved conditions in the electrical contracting industry by discouraging unintelligent and destructive price competition between individual contractors.

Public acceptance of electric ranges has increased greatly during the past decade, enabling manufacturers of electric ranges to reduce the price of the appliance to the customer. Electric utility companies, by and large, have put in effect more and more attractive promotional low rates to encourage the use of electric ranges and the many inherent adventages of electric cookery.

Since comparatively few residences had adequate wiring installed at the time they were built suitable for the operation of an electric range, the cost of range wiring installations has received considerable attention and strenuous efforts have been made to reduce the cost to the lowest possible figure.

The manufacturers have done an outstanding job of advertising and other sales promotion work on a national scale, but the task of actually getting the range into the home in many cities falls to the local dealers. In many communities the electric utility company is the leading local dealer in electrical appliances, and overcoming the obstacle due to the cost of the necessary wiring installation has, therefore, been one of their major problems in the sale of electric ranges.

Subsidies No Cure

Electric utility companies in various localities have tried numerous methods of getting around the problem of high wiring costs. Of course, the customer's sales resistance on this point has been minimized where the electric utility company stands all or a substantial portion of the cost of the range installation, but the cost is still there, and regardless of who pays the bill it finally becomes a part of the selling price of the range or the cost of promoting the sale of electric ranges.

In some localities an attempt has been made to reduce the standard of wiring specifications in order to lower the cost, the size of copper has been reduced to less than that recommended by the National Electrical Code and substandard installation methods have been permitted. Such methods are obviously detrimental to all parties concerned.

Manufacturers of wiring materials have been encouraged to carry on a great deal of research work for the purpose of producing new and lower-priced materials and they have been very prolific in the matter of bringing out so-called new materials.

Since utility companies are primarily engaged in the production, distribution and sale of electricity, they do not, as a rule, care to establish a department employing wiremen and engage in the business of wiring the inside of customers' premises. Such wiring jobs as may be necessary in connection with the customer's use of electric ranges are frequently turned over to electrical contractors, often to journeymen contractors, who may quote a low price with little or no re-

gard for the true prime cost, proper profit and for necessary overhead incident to all businesses. Usually wiring orders for range installations are spread among as many contractors as possible so that enough man-power will be available during campaign periods, when the number of ranges sold greatly exceeds sales during other periods of the year, and further, in the belief that by including as many contractors as possible the utility companies will promote further good will of all the contractors with whom they do business.

Sub-Standard Wiring

None of these methods have accomplished anything of a permanent value toward cost reduction with the exception of certain Code revisions under which ranges have been permitted to be equipped and sold as portable appliances, eliminating, further, some expensive switching and metering devices. Where the size of copper has been reduced below standard the user becomes dissatisfied with electric cooking because the surface units, as well as the oven, may be too slow due to excessive voltage drop; where substandard wiring methods are permitted, trouble of some kind or other usually develops, resulting in further dissatisfaction and retarding the sale and use of electric ranges; new kinds of materials have saved little or nothing because in many cases they have served only to prevent standardization, and in that way have actually, in some cases, increased the costs.

Giving the work to journeymen contractors hasn't been satisfactory because as a rule they cannot give good service, are often unreliable and, when they find that the price they quoted was too low, they attempt "substandard" installations wherever possible.

The policy of the Youngstown division of Ohio Edison Company toward the men engaged in the electrical contracting branch of the industry has always been everything that the contractors could reasonably expect, and the co-operation which has existed between the company and the association has been productive of many beneficial results for the industry as a whole. For several years prior to September, 1937, range wiring installations were divided on an equal basis among the members of the local Contractors' Association at a price agreed upon from time to time by Ohio Edison Company and the association.

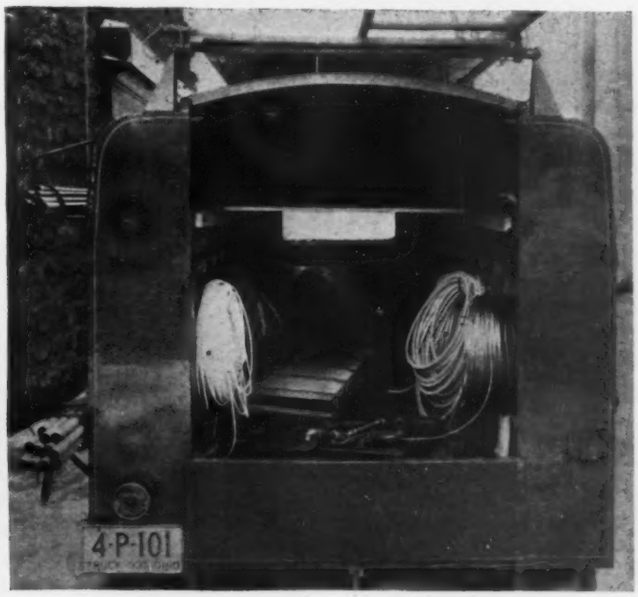
Price Rise Halted

The agreement between Ohio Edison Company and the association covering range wiring installations expired in August, 1937, and at that time increases in the cost of labor and materials made it necessary for the association to ask for a substantial increase in the contract price covering range installations rather than to offer a reduction. The co-operative spirit which had always existed made possible the most frank discussion of all of the items which must be included in agreeing upon a fixed contract price. From the discussion it appeared that the only way a reduction could be effected was to have all of the installations handled by one contractor so as to give an opportunity to specialize in this type of work, standardizing materials used and installation methods, thus reducing the overhead per job by spreading it over a larger volume of business. Since the analysis of the situation made it quite apparent as to what results could be expected from specialization and standardization, an officer of the Contractors' Association proposed, and his proposal was adopted, that the individual members of the association should organize a company in which each member would be given an opportunity to become an equal shareholder and that the new company thus formed should negotiate a new agreement with the Ohio Edison Company for all of the range and water heater installations in the district.

These negotiations resulted in a reduction in the price of about 20 per cent below the then existing price, and it was agreed that this price should be reviewed to the new company from time to time as the volume warranted and the price adjusted so as to insure the lowest cost possible to the utility, at the same time yielding a

Range wiring streamlined

Ohio Edison and Youngstown, Ohio, contractors work together for fast economical range wiring installations. Of three meters shown, one is for lighting and cooking, second for off-peak water heating, but third "meter" is time clock in outdoor type meter socket.



Never forget their tools

Trucks used by two-man crews are completely equipped work shops on wheels.

These half-ton trucks average 9 miles per job with steel body tailor-made for range wiring jobs.

reasonable profit to the new range installation company.

During the twelve-month period which ended October 1, 1938, the number of installations made by the new company was about 50 per cent less than had been expected. This was due to a reduction in the number of ranges sold because of the general decline in business conditions during the period, but the savings which had been effected by specialization and improved installation methods were sufficient to allow the new company to operate with a small profit.

New Contractor Organization

The new company was given the name of the Steel City Installation Company. Several trucks were immediately purchased, especially outfitted and equipped for the specialized work to be done. Special tools were developed and materials were purchased in larger quantities than the average individual contractor could afford to purchase at one time, and efficient, competent journeymen and journeymen's helpers were employed.

These men became more and more efficient in the specialized work performed, all of which permitted the company to operate at a very small margin of profit even though the actual volume of business was about one-half of the volume expected and upon which the contract price was agreed to between the Steel City Installation Company and Ohio Edison.

Our company's prime cost for a complete range installation is approximately 30 per cent less than the average prime cost of the various contractors who were doing this work prior to September, 1937. The savings effected have been about equal in both material and labor, while the records show that our company has had a small increase in direct job expense; this increase is explained by the fact that our truck cost is allocated to each job as a direct job expense instead of being absorbed in general overhead, as was being done by individual contractors.

The saving made in material cost is due to quantity purchases and to the fact that material prices in general have been slightly lower during 1938 than they were during 1937.

The average labor per complete range installation has been reduced from eight to five and one-half journeymen-hours. Several factors are responsible for this:

First—Standardization of materials and methods. The same type of wiring materials is used in every job and the same installation method is followed in so far as the construction of the premises will permit.

Second—The same men are employed as far as possible. When the same mechanic works on the same kind of work day after day, handling the same materials and following the same general installation method, he becomes an expert and finds for himself many short cuts and means of saving time which his employer would never think of.

Third—A journeyman and an apprentice work together. After an intelligent apprentice has worked for a few months on this class of work he can, while under the supervision of a competent journeyman, do the rough and arduous work on the job, thus permitting the journeyman to conserve his energy for that part of the work requiring more skill and experience. Of course, since the apprentice receives a much lower wage rate, the hourly cost per crew is reduced.

Fourth—The territory served by the Steel City Installation Company has a radius of more than 15 miles, while our average truck mileage is 9 miles per job. Each crew, a journeyman and a helper, is provided with a ½-ton truck equipped with a steel body especially designed and built to order for the purpose. The trucks are of the covered body type, equipped with ladder racks, conduit racks, vise support, hooks for coils of wire and cable and bins and compartments for storing other materials separately, such as the different kinds of fittings and devices required, so that they are readily accessible. It is never necessary for a crew to come back to the shop for anything. This method reduces traveling time to a minimum, and being well and properly equipped gives the mechanics an incentive to do their jobs well. Each truck is equipped with the best tools and equipment that can be obtained and they are kept in good condition. Poor tools and worn-out equipment result in unsatisfactory work and reduced efficiency. It is natural for a mechanic to think, "If the boss doesn't care, why should I?"

Youngstown Specifications

Since this discussion is intended to point out what can be accomplished toward reducing costs on small wiring jobs by specialization and standardization, a statement of our dollar-and-cents costs or prices would be of little value, because they might be too low for one community and too high for another, depending upon the Code requirements and specifications for the work to be done. The question at issue really is: To what extent can the cost of small wiring jobs be reduced and still meet a given set of specifications at a given wage scale for electricians if they are handled on a quantity basis so as to permit of standardization and specialization? If it were possible for Code requirements and the specifications for electric range installations as well as the utility companies' policies throughout the country to be standardized, a great deal could be accomplished toward reducing the installation cost of this popular appliance. In order that you may make a comparison with your own community, the present specifications in Youngstown and vicinity for a complete range installation in a single-family dwelling are as follows:

Service runs consist of two No. 6 R.C. and one No. 6 bare conductors in 1-in. electrical metallic tubing from service entrance fitting not less than 15 ft. above the ground level at street side of building nearest company's distribution pole through an outside meter socket to a 60-amp., three-pole S/N safety switch and distribution cabinet with 60-amp. range circuit and four 15-amp. branch circuits. The neutral and equipment shall be grounded to a water pipe or driven ground, using No. 4 bare copper conductor carried exposed, but protected as much as possible on basement ceiling and wall. Install a No. 4 bare conductor copper jumper around the water meter and connect old lighting and appliance circuits to new distribution center by a method approved by the prevailing Code. Install range run circuit from distribution cabinet to location of range plug receptacle in three No. 6 bare neutral unarmored service entrance cable. All ranges are delivered by the utility company, or the dealer making the sale, with cord and plug attached and are connected in the same manner as any portable appliance. Most services are located at the front corner of the premises, which, of course, involves longer range runs than in communities where services are located at the rear of the house.

Overhead Reduced

So far I have talked only about the reductions which can be effected in prime cost and have said nothing about reductions in overhead. Direct job supervision is reduced to a minimum, because each journeyman is entirely capable of laying out his own work to the best advantage on jobs of this nature, and an intelligent clerk can route the orders and assign what constitutes a day's work to each crew.

Stockroom, delivery and transportation expenses are combined and cost little more than transportation alone, since each truck is a traveling stockroom. Of course, in communities where the local utility company's policy differs and where each range purchaser must be individually dealt with, this saving cannot be made. Our experience proves that where a sufficient number of range and water heater wiring jobs can be concentrated in the hands of one concern it is possible by specialized and standardized methods to reduce the prime cost by approximately 30 per cent as compared to the prime cost where small jobs of this nature are handled by big job methods, and where the same utility company policy prevails as in our community it is possible to reduce overhead expense by an appreciable percentage.

Electric Pumping for Cost of Coal

Better control and reduced expense result from electrification of small Ohio town's water works — Improved response to emergency water demands

FRANK E. WIATT, *Assistant Supervisor, Power Sales Division, Cincinnati Gas & Electric Company*

COST of purchased energy used in operating the newly electrified municipal water works of Franklin, Ohio, will, it is expected, just about equal the coal bill for the displaced steam-driven pumps. This will leave the former cost of labor and expendable supplies as a direct saving applicable to writing off the cost of the change.

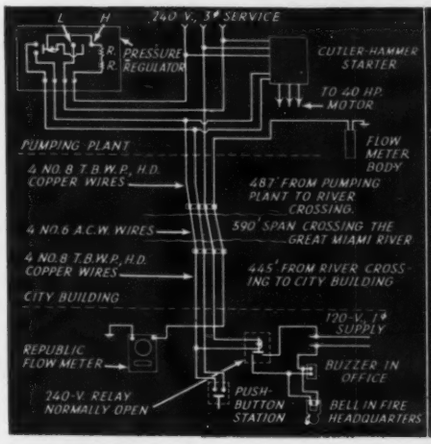
Franklin is a thriving city, with a population of 4,500, situated in Warren County, approximately 40 miles north of Cincinnati. Its chief industries are six large paper mills. Average daily water consumption is 450,000 gal. in summer and 300,000 gal. in winter. Daily demands fluctuate considerably when any of the paper mills are forced to draw water from the municipal system, due to difficulties encountered with their private supply.

Before electrification the water works contained three steam-driven pumps, each rated at 750,000 gal. per day. About 600 tons of coal was consumed annually. The new equipment consists of two 3,600-r.p.m. Ingersoll-Rand single-stage pumps driven by General Electric motors. The pumps are rated at 350 and 500 gal. per minute and are driven by 30- and 40-hp. motors respectively.

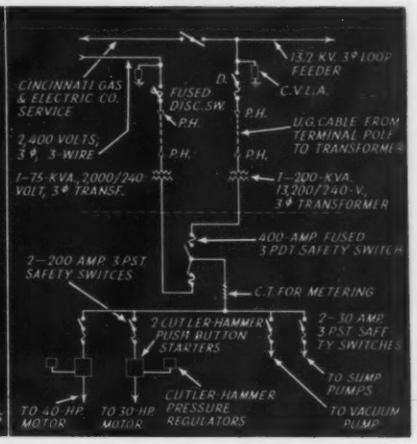
Water is obtained from four 10-in. drilled wells adjacent to the pumping plant. The maximum output of all wells combined is about 1,200 gal. per minute. System storage is maintained in a standpipe located on the opposite side of town from the pumping plant. It is 34½ ft. in diameter by 81½ ft. high and has a capacity of 541,000 gal., which maintains a system pressure of about 160 ft. or 70 lb.

The two pumps are automatically

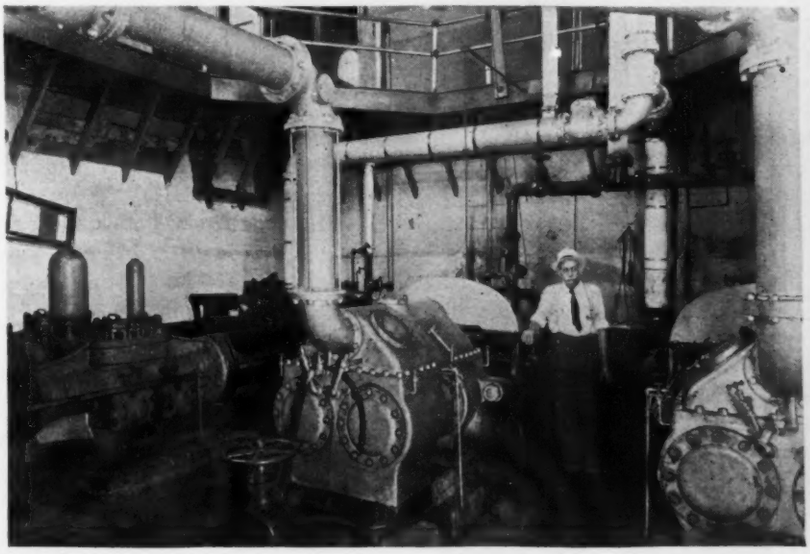
[*Continued on page 95*]



Remote indication and control circuit


CINCINNATI GAS & ELECTRIC CO. SERVICE
2,400 VOLTS, 3φ, 3-WIRE
1-75-KVA., 2000/240 VOLT, 3φ TRANSF.
FUSED DISC. SW.
P.H.
13.2 KV. 3φ LOOP FEEDER
C.V.L.A.
U.G. CABLE FROM TERMINAL POLE TO TRANSFORMER
1-200-KVA. 13,200/240-V., 3φ TRANSFORMER
400-AMP. FUSED 3 PDT SAFETY SWITCH
2—200 AMP. 3 PST SAFETY SWITCES
C.T. FOR METERING
2 CUTLER-HAMMER PUSH BUTTON STARTERS
2—30 AMP. 3 PST SAFETY SWITCHES
TO SUMP PUMPS
TO 40-HP. MOTOR
TO 30-HP. MOTOR
CUTLER-HAMMER PRESSURE REGULATORS
TO VACUUM PUMP

Supply connection diagram



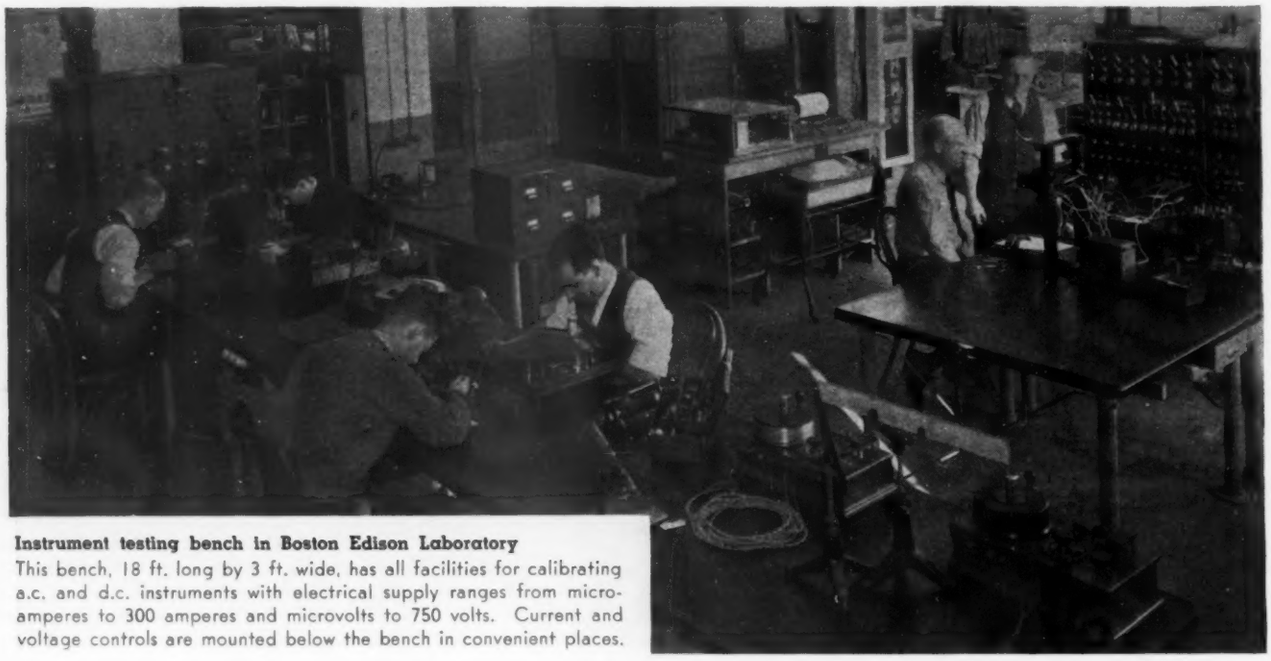
Then and now

The figure of Franklin's superintendent of water works, Charles H. Coleman, gives scale to the three steam-driven pumps and to the two electrified units that replace them

Scope and Work of Electrical Instrument Laboratory

Engineering aspects of instrument maintenance — Facilities which improve the quality of calibration and repair work — Departmental methods

ARTHUR W. WEEKS, *Boston Edison Laboratory*



Instrument testing bench in Boston Edison Laboratory
This bench, 18 ft. long by 3 ft. wide, has all facilities for calibrating a.c. and d.c. instruments with electrical supply ranges from microamperes to 300 amperes and microvolts to 750 volts. Current and voltage controls are mounted below the bench in convenient places.

FUNDAMENTAL primary standards, energy supply and other facilities for calibration of instruments, records of instruments and of their calibrations, provision of best conditions for testing work and repair practices are all matters for consideration in the equipment and operation of an electric utility instrument laboratory. The elaborateness of facilities in terms of equipment and skilled personnel will depend upon the amount of work done in the laboratory. It is difficult to set up a yardstick in this regard, but some idea may be taken from an analysis of several hundred instrument repairs recently made. The analysis given in the accompanying table shows three classifications of equipment and necessary personnel.

This analysis shows that nearly 40 per cent of instrument repair work can be cared for without great expenditure for expensive equipment and highly skilled men and that well-trained men fairly well supplied with good equipment can handle nearly 90 per cent of instrument repairs. Therefore the ultimate in personnel and facilities is not necessary for the usual instrument laboratory.

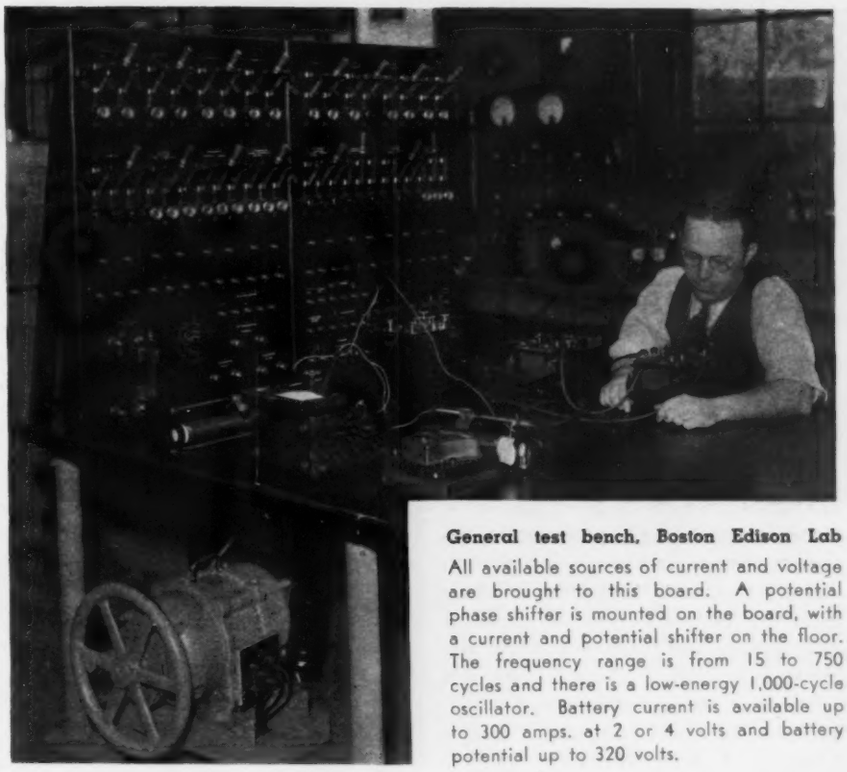
Fundamental primary standards are shunts, resistors and cells. Shunts should be used in an oil bath to avoid serious temperature rise, although constant temperature is unnecessary. Excessive temperature endangers the shunts and acidifies the cooling oil. Acid oil will attack the shunt metal, usually increasing the resistance, but often a less easily detected result is caused by reducing the copper content of the shunt alloy at the exposed surface, which results in change of the resistance - temperature coefficient. Duplicate sets of shunts and resistors should be maintained, one in use and the other reserved for cross-checks and verification by the Bureau of Standards every two or three years.

Unsaturated standard cells are less sensitive to temperature changes than the saturated type, but, if the standardizing room is subject to wide temperature fluctuations, it may be advisable to lag the cells in a heat-insulated box or even in a temperature-controlled oil bath. Several cells should be maintained and comparison calibrations made periodically. One or more should be verified by the Bureau of Standards annually, as all unsaturated cells have a small, rather constant, voltage change with time.

Good maintenance and careful observation are usually accorded standards, but it is not unusual to find the necessary equipment, such as batteries, generators, control resistors, etc., neglected.

"Low-discharge" lead cells are useful for low-current, constant-potential applications, such as the auxiliary batteries for potentiometers. These may be left continuously in circuit, charged annually, and provide a steady source of potential.

The a.c. system is usually the only available source, and there is no simple solution for the problem of voltage variation. If the frequency is constant, a synchronous motor driving a battery-excited alternator provides a remarkably steady source of alternating current. The cost of this auxiliary equipment will be justified if many instruments are calibrated, because of the increased speed and accuracy resulting from a steady source. A wide range of current and potential can be obtained by the use of suitable transformers and control equipment. If induction regulators are used, care must be exercised to avoid the wave shape distortion, particularly at the positions of minimum energy transfer.



General test bench, Boston Edison Lab

All available sources of current and voltage are brought to this board. A potential phase shifter is mounted on the board, with a current and potential shifter on the floor. The frequency range is from 15 to 750 cycles and there is a low-energy 1,000-cycle oscillator. Battery current is available up to 300 amps. at 2 or 4 volts and battery potential up to 320 volts.

Test benches for standardizing work should be substantial, free from vibration and of proper height. When chairs of standard height are used benches about 31 in. from the floor will obviate discomfort and tenseness, which are not conducive to sustained high accuracy.

A good numbering system is the first step toward adequate and accurate records. The use of manufacturers' serial numbers is probably unwise because they are cumbersome, and there is the possibility of two instruments of different make bearing the same serial number.

A satisfactory system divides different classes of instruments into groups to facilitate identification and effective utilization of records. A letter may precede the number to indicate the department to which an instrument is assigned, such as "L" to designate laboratory. A suggested grouping is:

L 1 to L 99, d.c. millivoltmeters
L100 to L199, d.c. voltmeters
L200 to L299, d.c. ammeters
L300 to L399, a.c. voltmeters
L400 to L499, a.c. ammeters
L500 to L599, wattmeters
L600 and on, miscellaneous instruments, hot wire, electrostatic, etc.

A file of calibration data is essential, but much laborious copying of data can be avoided by entering test results directly on file cards. Mimeographed or printed cards for ten- and fifteen-point scales will provide for the majority of instruments. Maintenance and use of this file require an "instrument-minded personnel" taking pride in neat, accurate records.

Group 1—Highly trained repairmen and highest order of equipment (The user of 100 instruments or less may better send these repairs to the factory):

Repair Required	Per Cent of Total Repairs
Sharpen pivots	6.9
Replace pointer	2.8
Sharpen knife edges (recorders)	1.4
Rescale	0.8
Adjust iron vane	0.8
Replace lead-in spiral	0.6
Total	13.3

Group 2—Well-trained personnel and reasonable equipment:

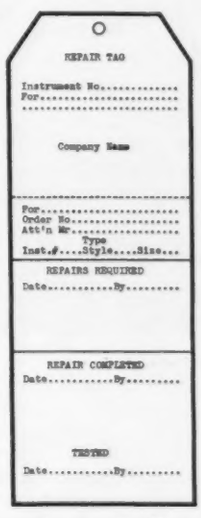
Repair Required	Per Cent of Total Repairs
Repair or adjust electrical circuit	11.2
Clean entire instrument	9.2
Balance moving element	7.5
Clean jewels	6.4
Replace pivots	6.1
Clean and adjust damping chamber and vane	1.9
Clean clock (recorders)	1.7
Replace resistance	0.6
Resolder control spring	0.3
Total	48.0

Group 3—Minor repair work, with minimum equipment and nominal skill:

Repair Required	Per Cent of Total Repairs
Replace carrying case handle	7.5
Straighten pointer	6.4
Replace cover glass	5.3
Repair carrying case	5.0
Set zero (no external zero set on instrument)	3.4
Refasten paper scale	2.8
Tighten binding posts	1.9
Adjust control spring	1.9
Install rubber feet	1.7
Adjust jewels	1.4
Replace millivolt leads	1.4
Total	38.7

Recommended form of instrument repair tag

Provides for entering data to accompany the device to the shop, being filled in as the work progresses and filed after completion. The author suggests that manufacturers supply good "Returned Apparatus" tags in duplicate, for instruments undergoing factory repairs. The customer would fill in his part and the manufacturer his. Both tags would go with the instrument to the factory, one being retained by the maker and the other by the user, giving both parties a complete history and avoiding misunderstanding.



DUO-COIL TRANSFORMERS

S. O. MILLER, *Electrical Engineer, Lower Colorado River Authority, Austin, Tex.*
H. R. VAUGHAN, *Engineering Division, Westinghouse Electric & Mfg. Co., St. Louis, Mo.*

A POWER SYSTEM consisting of hydro generators connected over long transmission circuits to synchronous equipment at the load usually requires special provisions for increasing its transient stability. The more common methods, one or more of which may be used in varying degrees, are high WR^2 and low-reactance generators, sectionalized transmission lines and high-speed circuit breakers. A study on the a.c. network calculator indicated that stability of the Lower Colorado River Authority system could be obtained by sectionalizing the high-voltage buses and by providing the step-up transformer at the intermediate generating stations with dual high-voltage windings.

The Lower Colorado River Authority hydro-electric project (Fig. 1) on the Colorado River in Texas will ultimately consist of a series of interconnected power plants beginning at Buchanan and extending down the river to Austin, a total distance of sixty miles. The first two plants, Buchanan and Inks, have been completed and work is well under way on Marshall Ford and Austin. A fifth plant, located at Marble Falls, will probably be added later. The problem as investigated on the network calculator was to clear faults on the interconnecting transmission lines or outgoing feeders without losing synchronism between the hydro system and other interconnected systems or without having to shut down or resynchronize either Inks or Marble Falls.

The relative "internal voltage" phase angles of the different generators making up an interconnected system are determined by the circuit constants of the interconnection, the amount of load supplied by the various machines and the voltages at the cardinal points on the system. Under normal steady state operation the relative phase angles will remain constant for any given load and voltage condition. In general, the phase position of the sending end machines will lead those of the receiving or load end of the system.

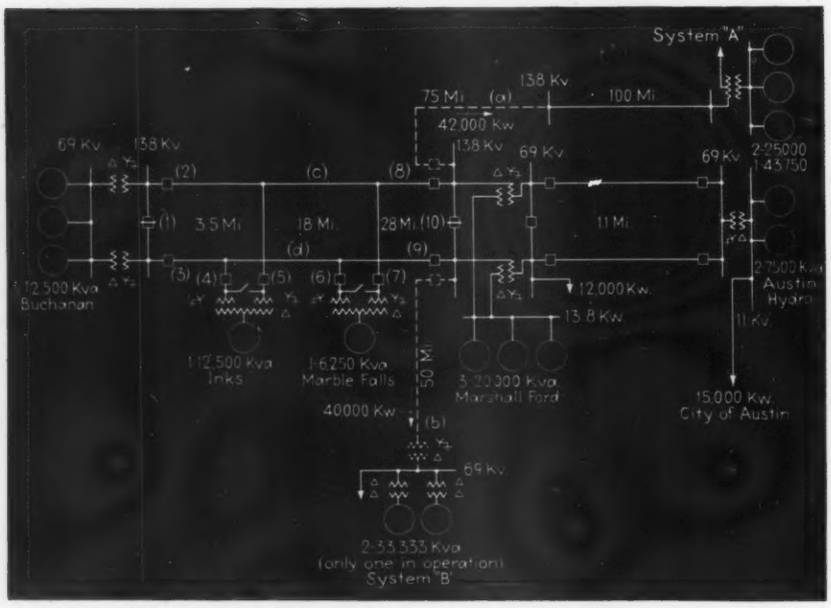


Fig. 1—Dual-winding transformers at intermediate station with buses sectionalized at the termini of the 138-kv. tie lines

Excluding the power taken by the city of Austin from the Austin end of the system, the main feeder circuits and possible interconnections with existing steam generating systems will emanate from Marshall Ford, which will eventually be the largest station in the group and at which point there will be available 138-kv. and 69-kv. sources of transmission voltage. All stations will be electrically interconnected by means of a double 138-kv. transmission circuit from Buchanan to Marshall Ford and by a double 69-kv. circuit from Marshall Ford to Austin. The 138-kv. and 69-kv. circuits will be connected together through auto-transformers at Marshall Ford.

Load Redistributes

When a fault or a major switching operation occurs the circuit constants undergo a change which results in a sudden redistribution of load due to a change in power-angle characteristics between the various units. Those machines that are unloaded will tend to speed up and advance in phase position and those machines that are loaded up will tend to slow down and retard in phase position. The rapidity of the change in phase angle will depend upon the magnitude of the load change and the stored energy in the rotors. If the change in phase angle is too rapid the machines may pull out of step before the fault can be cleared

Station Output at Time of Fault

Station	Output in Kw.
Buchanan	34,800
Inks	9,700
Marble Falls	4,900
Marshall Ford	54,600
Austin Hydro	10,300
System "A"	71,000
System "B"	0*

* One 30,000-kw. unit floating on line.

AID SYSTEM STABILITY

High-voltage buses sectionalized in conjunction with dual high-voltage windings in step-up transformer enhance hydro system stability at lower cost than speeding up circuit breaker operations or increasing the mechanical inertia of rotating parts in generators — Scheme prevents out-of-step on faults

and steady state conditions re-established. By means of the a.c. network calculator it is possible to determine the change in relative phase angles between the different generators making up an interconnection at the time of a transient disturbance and thus indicate whether or not the system will remain stable. In studying the stability of the Lower Colorado River Authority system the interconnections and load distribution shown in Fig. 1 were taken as the worst probable conditions. Double line to ground faults were taken as criteria of transient stability, since they represent the severest disturbances that are likely to occur. With high-speed relaying and the system grounded, the possibility of three-phase faults near the buses would be remote and would not justify designing the system to be stable against all such occurrences. The faulted line section was assumed to be cleared in twelve cycles, as made possible by high-speed relaying and normal eight-cycle breakers. All generators were assumed to have normal values of reactance and WR^2 and the transformers normal values of reactance. The distribution of load between the various generators imme-

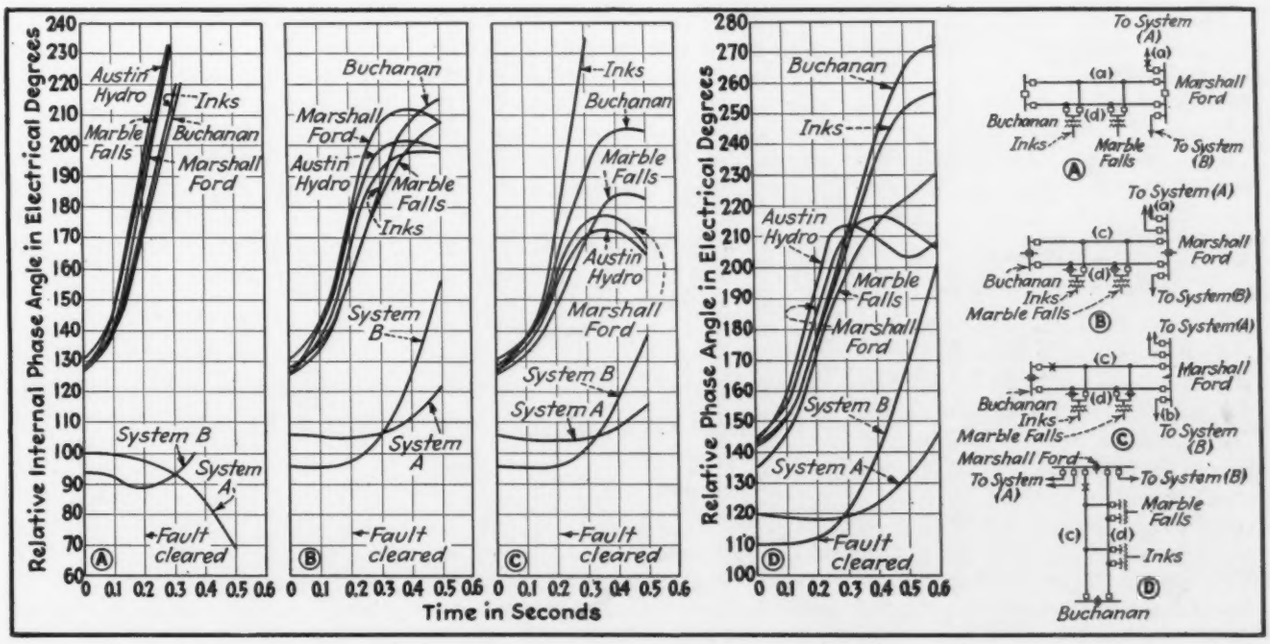


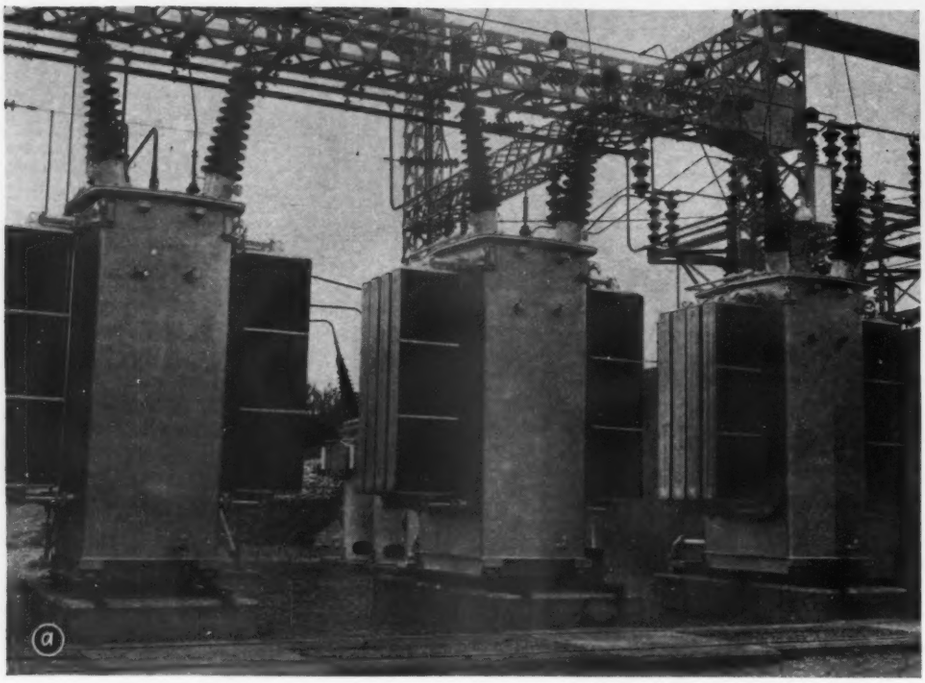
Fig. 2—Characteristic faults and system set-ups point way to optimum set-up for stability

(a) With the 138-kv. lines bussed at both ends, Inks and Marble Falls connected to both lines through two-winding transformers, a two-line-to-ground fault on one line at "a" or on one of the 138-kv. feeders near Marshall Ford, all the hydro generators would be unloaded and caused to advance rapidly in phase angle. Synchronism would be lost with system B and it would be impossible to reclose line "a" fast enough so that synchronism with system A could be maintained.

(b) Effect of splitting 138-kv. buses. Time-angle curves for a fault near Marshall Ford, on one of two parallel 138-kv. lines from Marshall Ford to system "A" with the 138-kv. bus-tie breakers at Buchanan and Marshall Ford open and with Inks connected to line (c) only and Marble Falls connected to line (d) only by means of conventional two-winding transformers. Under this condition the positive sequence voltage on line (d) would remain substantially high and the hydro generators would advance in phase angle less rapidly. Synchronism would be maintained with system "A" and system "B."

(c) Effect of a fault on line "c" under the same operating conditions as in (b) with Inks switched over to line (d) without losing synchronism. Although synchronism would be maintained with system "A" and "B," it would be impossible to switch Inks over to line (d) with normal speed breakers and a normal WR^2 generator without losing synchronism. The Inks plant would therefore have to be shut down and resynchronized onto line (d), with a temporary loss of the plant output. The same reasoning would apply to Marble Falls, so that either the Inks plant or the Marble Falls plant would be subject to shut-down at the time of a fault on the 138-kv. circuit to which the respective plant was connected.

(d) Dual high-voltage windings sustain voltage for maintenance of stability. Fault on line "C" near Marshall Ford; 138-kv. bus-tie breakers open; Inks and Marble Falls connected to both lines. Faulted line cleared without loss of synchronism or temporary loss of either Inks or Marble Falls.



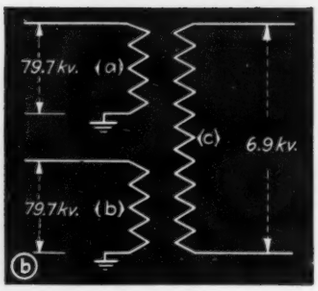


Fig. 3—Banks of three 4-167-kva. dual-winding transformers

(a) Installed at Inks generating station as stability aid.

(b) Winding schematic of these transformers.

Per cent impedance on 4,167-kva. base.

Winding	Per Cent
(a) to (c)	23.8
(b) to (c)	23.8
(a) to (b)	61.8
(a) and (b) parallel to (c)	8.45

diately preceding the faults is shown in the accompanying table.

Typical results of the study, plotted in curve form, are shown in Fig. 2. The curves show the change in relative "Internal voltage" phase angles—voltage back of transient reactance—of each plant connected to the system during and immediately following the fault.

Split-Bus Effect Attained

In order to switch either the Inks generator or the Marble Falls generator over to the unfaulted line (Fig. 2c) without losing synchronism the WR^2 of the generator would have to be greatly increased and the operating time of the 138-kv. breakers speeded up. Increasing the WR^2 50 per cent would increase the cost of the generator approximately 10 per cent. Decreasing the operating time of the circuit breakers even from eight cycles to six cycles would increase their cost approximately 15 per cent.

Essentially, the effect of split buses at Inks and Marble Falls can be obtained by providing the transformers with dual high-voltage windings arranged to have normal reactance from the low-voltage windings to the high-voltage windings and high reactance between the high-voltage windings. Normally, one high-voltage winding would be connected to each of the 138-kv. lines as shown in Fig. 1. At a time of a fault on one of the lines the breaker connecting the high-voltage winding to that line would be opened and the output of the generator fed through the other high-voltage winding until the faulted line was cleared and put back in service or both high-voltage windings paralleled on one line by closing the 138-kv. motor-operated disconnect switch. As shown by Fig. 2d, this set-up will maintain stability for a fault on either 138-kv. line from Buchanan to Marshall Ford and permit clearing the faulted line without having to shut down and resynchronize either the Inks or the Marble Falls plant.

No Increase in Reactance

The dual-winding transformers now installed and in operation at Inks are shown in Fig. 3a. Fig. 3b shows schematically the arrangement of windings and the values of reactance between windings. Two high-voltage bushings, two low-voltage bushings and two high-voltage neutral bushings are provided on each transformer. Normally each high-voltage winding will be grounded and connected to one of the 138-kv. lines. Because of the high reactance between windings, a relatively small amount of fault current can flow from one 138-kv. line to the other through the transformer and a high positive sequence voltage will be maintained on the unfaulted line. However, the reactance from the low-voltage winding to either of the high-voltage windings is normal, so that the voltage regulation for load current feeding through both high-voltage windings in parallel is no greater than with standard, two-winding transformers.

The use of the dual-winding transformers has made unnecessary high WR^2 generators, high-speed circuit breakers or sectionalized 138-kv. transmission lines, any one of which would be costly.

Conclusion

The relatively short transmission lines and the low impedance autotransformers at Marshall Ford constitute a rigid electrical tie between the hydro plants, so that with the 138-kv. lines bussed together a fault collapses the system positive sequence voltage and causes the hydro system to pull out of step with other systems to which it may be connected. By splitting the 138-kv. buses at Buchanan and Marshall Ford and connecting Inks and Marble Falls each to only one 138-kv. line synchronism can be maintained with other interconnected systems, but a temporary loss of the output of the Inks or Marble Falls plant would be caused by a fault on the line to which the respective plant was connected.

By connecting Inks and Marble Falls each to both lines by means of dual-winding transformers stability without the temporary loss in output of either plant can be obtained with a minimum outlay in equipment.

A News Approach to Utility Advertising

Telling the public what the company means to the community as a taxpayer, an employer, a contributor to local business and a good citizen is very effective in creating good will

GOOD WILL — elusive, intangible and invaluable — acquired through trust and lost through mistrust, is possibly the most perishable component of successful system operation and its maintenance must be governed accordingly. Vital tool in the maintenance of good will is advertising. However, the effectiveness of advertising as such a tool depends directly on the care exercised in its planning and presentation.

Realizing that advertising which fails to command attention is utterly useless, the Indiana Service Corporation of Fort Wayne, through Arthur M. Paulinson, its manager of public relations and advertising, has vitalized its newspaper presentations through use of a dynamic spot news approach that immediately captures reader attention. Once captured, the reader's attention is drawn to a newsworthy theme portraying the company's contribution to the welfare of the community it serves.

Thus, through a skillful combination of news and institutional promotion, the company has achieved an educational program, through advertising, that is an effective good-will building force in the territory served by the company.

A few examples show how the news approach is used to vitalize this program. On the day when the spring installment of county taxes was due the accompanying advertisement appeared in local papers stating that *today* the Indiana Service Corporation paid $66,087.85 of its $132,146.62 real estate and personal taxes to Allen County and Fort Wayne. "Rush" pictures of the check and its delivery to the county treasurer headed the previously prepared, carefully worded text. This text explained that the "Traction Light," the county's largest taxpayer, benefited every Fort Wayne citizen by contributing heavily to salaries of policemen, firemen, teachers and other city and county employees in addition to supplying adequate and dependable electric service.

Further demonstrating the fact that utility dollars spent for payroll, taxes and purchases remain in the community is the accompanying portion of a six-column pictorial advertisement. Pictures of employees receiving payroll checks, and buying locally, give meaning to the statement that the $970,000 annual payroll finds its way to local merchants and professional men. "Traction Light" paying taxes is coupled with a newsworthy photo of an addition to the local high school *under construction at the time the ad appeared.* Pictures of construction then in process on the system, showing equipment made by firms with plants in

[*Continued on page 97*]

TODAY...
INDIANA SERVICE CORPORATION
Traction Light
PAID ITS SPRING INSTALLMENT OF TAXES
$66,087.85
TO THE COUNTY TREASURER FOR THE PEOPLE OF FORT WAYNE AND ALLEN COUNTY
INDIANA Service CORPORATION

A news treatment of local tax payment motivates message of utility's contribution to the community

Traction Light
HELPING FORT WAYNE
Traction Light payroll dollars, $970,000 each year, help Fort Wayne as they find their way to food merchants, clothing stores, doctors, material and coal dealers, druggists, oil stations, etc.

Pictorial advertising tells story of community benefits through payroll, taxes and purchases

Precision Printing Plant Demands Modern Lighting

Production of multiple business forms requires exact registration of printing and perforations and must have the best possible light to insure it

F. W. STEIN, *Works Manager Standard Register Company, Dayton, Ohio*

You know this plant is well lighted
A lighting installation which combines the blue-green of mercury-vapor light and the yellow-red of incandescent light supplies the plant with a "synthetic daylight" illumination at all hours and is a large contributor to continuous production and maximum working comfort

No hand shadows
In the drafting room a high illumination level is provided by the use of Cooper-Hewitt "combination" lamps. The lamps are mounted directly over each desk at a height of 2 ft. and produce more than 100 ft.-candles of evenly distributed light. Shadows around the draftsman's hands are reduced to a minimum by the long-tube sources.

PRIMARY requirement of the Standard Register Company, maker of perforated multiple business forms, is to achieve precision printing which insures perfect registration and accuracy of originals and duplicates in recording on multiple copy, continuous forms. Every possible means has been utilized to attain the highest grade of exact printing. Plates are inspected with precision gauges and microscopes to catch errors as small as one-thousandth of an inch in the spacing or alignment.

In the composing room, where the men must work on bright metal type, particular attention has been given to lighting. In order to obtain high illumination levels with a minimum of glare, it was necessary to use a light source inherently low in unit brightness. For this reason we adopted the long tube Cooper-Hewitt mercury-vapor lamps, which furnish light practically without glare. One 450-watt lamp is suspended over each bank, maintaining an illumination level of approximately 200 ft.-candles on the work.

Employee benefits resulting from this type of lighting are regarded highly by us. One of our men, who has worn glasses for about ten years, discarded them when the mercury lamps were put into service. Another of the men working in the composing room has reported that, after working 60 days under the new lighting, his former headaches, which were due to eye fatigue, were eliminated entirely.

The editorial and proofreading departments are also entirely lighted by Cooper-Hewitt lamps. Work in this area is probably more difficult than that in the average proofreading department, inasmuch as very small

printing must be read and distances between lines and the thickness of these fine lines must be checked. After final check by proofreaders, the copy and order are sent to the stereotype room and from there to the press room for printing. Since continuous printing orders are seldom for less than 5,000 sets, and frequently are for one hundred thousand or even million lots, an error in this department could be costly indeed. Better lighting is proving to be a profitable investment here in helping to reduce the number of preventable proofreading errors.

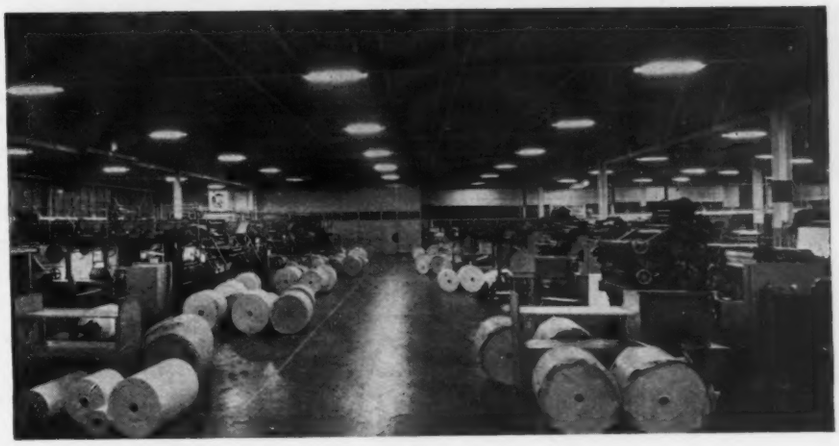
Lighting of the general press room area is supplied by "combination" lamps, spaced on 12x15-ft. centers. More than 100 of these units, made by the General Electric Vapor Lamp Company, are distributed throughout the production areas. When color work is being run on the presses we have found it important that the light sources simulate daylight as nearly as practicable. Synthetic daylight is supplied in this area by blending, with "combination" units, the blue-green color of mercury-vapor light and the excess yellow-red of incandescent light. The units used in this department are composed of a 275-watt Cooper-Hewitt tube in combination with four 150-watt incandescent lamps.

The task of setting up complicated rotary presses has been simplified by this lighting installation and time is saved because there is now little need for extension lamps or auxiliary lighting equipment. Ink coverage, perforating, paper feeding and all other factors of press performance can now be examined and controlled better than before.

On dark, cloudy afternoons the illumination provided blends perfectly with daylight. Thus a daylight quality of illumination can be provided over a large area 24 hours a day. Because of the quality of the light provided here, the production on the night shift is equal to that of the day shift.

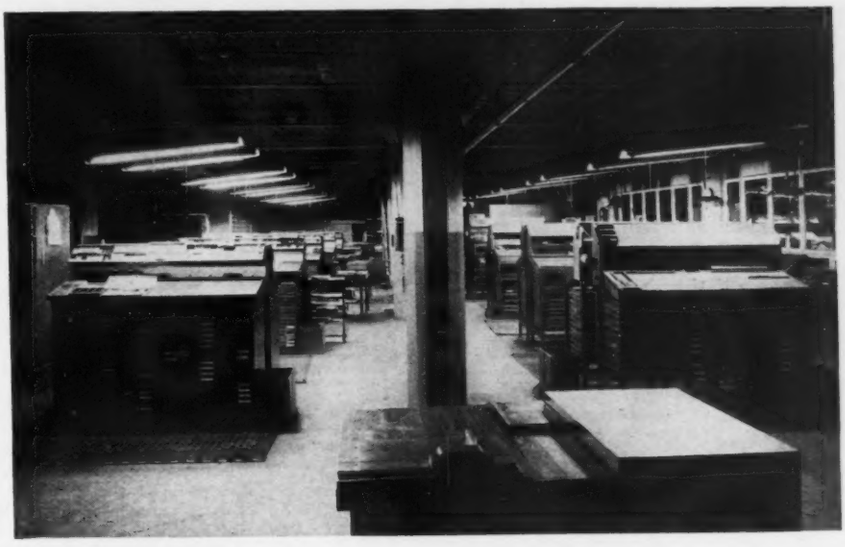
In the collating department color identification is an important factor in rapid handling of forms. As many as 50 different shades of paper are used for the multiple forms produced. Here color-corrected lighting is provided by "combination" units, composed of a 275-watt circular mercury-vapor tube and a 500-watt in-

[*Continued on page 98*]



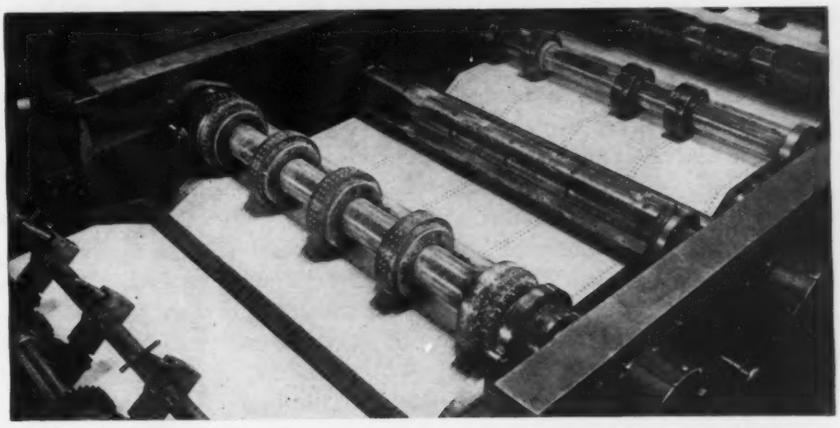
For precision press work

The primary requirement in printing in this plant is to insure perfect register in recording on multiple business forms. Plates are inspected with precision gauges and microscopes to catch errors as small as one-thousandth of an inch in spacing or alignment. In the press room the use of more than 100 G. E. "combination" lamps, spaced on approximately 12 x 15-ft. centers, has produced a daylight quality of illumination, evenly distributed over the entire area.



In the typesetting department

High efficiency with a minimum of eye fatigue is achieved by the use of "combination" lamps mounted parallel over each type case. Reduction of shadows and glare contribute largely to the high quality work produced.



Close work and fast, too

The characteristic marginal holes in Standard forms are punched at the rate of a billion a day. In order to keep errors at a minimum, it is necessary for the operator to keep a constant check on the punch press. Illumination for this task is supplied by more than 100 "combination" Cooper-Hewitt lamps.

Editorials

S. B. WILLIAMS, *Editor*

Apparatus Ratings in Statistics

EVERY PIECE of electrical equipment involved in the transfer of power has a rating and most of them have nameplates which carry such information. Offhand, it would seem a simple matter to add the cumulative items of any particular category and obtain a total which would be an index of the capability of that function (say, for example, generation) of a system. Certainly to the uninitiated it would appear that the same piece of equipment would appear with the same numerical rating in whatever listing it might be entered.

Unfortunately it is not at all that simple. There are good and sufficient reasons why it is not. First, the equipments in service today are of all vintages and made under advancing technology of an art which steadily betters the materials and designs. Many existing alternators and turbines and boilers and transformers have been rebuilt to give them higher capabilities for loading. Such thermal practices as reheat, superposition and bleeding change—usually favorably—the share of the load which the revamped machine may contribute. Alternator power factors are arbitrarily assigned. Transformers are enhanced in load-carrying ability by supplementary cooling measures. Transmission lines have their vulnerability to outage from lightning or other disturbances decreased by application of protective measures. System stabilities are enhanced so that more loads can be carried in emergency peaks. Summer loading is one thing, winter another. Who, then, can set a permanent unvarying, universal rating for any one piece of equipment, let alone for an assembly such as a power plant or a multi-unit substation or a network of scattered tie lines? It can only be done in summation figures if a multiplicity of modifying factors are arbitrarily assumed and prescribed for ruling conditions.

Admittedly this situation is bad for the statisticators in Washington or elsewhere who strive to reconcile discordant figures each of which is valid in the sphere for which it was established. One plausible escape is to adhere always to original nameplate data. But this is no royal solution, for at least two reasons. One is that a deduction from totals to cover reserve allowances is largely a matter of opinion. Another is that nameplates are basically the manufacturer's rating for guarantee purposes and not necessarily an index of full capability.

The problem is an intricate one. It is, however, capable of solution, but whether that solution rests in leaving the manufacturer's nameplate situation in the *status quo* and developing the necessary reconciliations for the various regulatory, financial and other offices, or whether solution lies in the direction of developing a more comprehensive nameplate, or whether as another alternative a way out lies in leaving present nameplates as they are and developing supplementary nameplates under operating company sponsorship, is one that cannot be decided until a great deal more thought and work are given to the problem. Certainly it would seem to offer another field for competent engineering thought and investigation.

Consumer Directors

AT THE LAST annual meeting of the Southern California Edison Company a stockholder wanted to know why directors were elected to the board who did not own stock. Under the California law, directors do not have to be stockholders, but the question nevertheless is interesting.

The two non-holders of stock are a dirt farmer and a merchant. They were placed on the board because they could bring to it the point of view of two very large elements of the company's business. The company wanted the consumer viewpoint.

Not so long ago Consolidated Edison elected a woman to its board in order to get a residential consumer's viewpoint. At the time that action was widely hailed as being progressive and conducive to better public relations.

Recently the idea was proposed by a utility executive that a board of directors represent not only the stockholders but the consumers and the employees. His theory was that with all these elements represented in the policy direction of a company there would be less possibility of trouble.

It is a good sign to find companies recognizing the advantage of bringing in an outsider's point of view. Certainly nothing can be put over on the public, if such even were tried, so long as an influential and respected member of the public is on the board. From that angle, the public is bound not to mistrust the policies of the company and is likely to feel that it will enjoy fair treatment.

After all, the interests of the customer in this day and age are of the greatest importance. If the customer is dissatisfied the company's corporate existence is in danger. The customer's interest need not be opposed to the interests of the stockholder. When the two can be

merged the company will be in the most prosperous condition.

Boards of directors have not always enjoyed public confidence. Maybe this is a way to make such boards real assets to a company. Consumer directors may in the long run be more protective of stockholders' interests than boards entirely made up of stockholders.

Individuality Versus Standardization

THERE is no conflict between initiative and standardization; there is between individualism and standardization. The conflict arises out of economic necessity.

One of the major problems of the electric utility industry is the necessity for reducing the cost of plant without impairment, perhaps with improvement, of service reliability. There will be economies resulting from improved efficiencies, but the resulting gain is necessarily getting less and less. Barring some revolutionary ideas that will completely alter present conceptions of how electricity can be generated and distributed, the greater economies must come through simplification and lower equipment and installation costs.

The profitable cultivation of thinner markets at rates which the customer can and will pay presupposes at the start lower cost of construction to serve such customers. Continued rate reductions and low inducement rates cannot always be met by improved sales volume.

During the first fifty years of its existence the utility industry, being in a measure virtually assured of a fair return, could justify cost on the basis of improved service. Under changed conditions, however, the approach to engineering must change. Individualism, as expressed in pet ideas and practices, must give way to standardization if lower costs will result. And there is no question but what they will, because special this and that for one company after another is bound to be reflected in higher prices for all.

Steel Forced to Modernize

MODERN sheet mills installed in the steel industry have taught this hard-boiled industry how to cut costs in production. According to well-founded reports the steel industry is now going to modernize its other mills. This would mean going to 60-cycle equipment, the abandonment of blast-furnace gas-engine plants and the adoption of a purchased power policy as a general principle.

Steel mill equipment and controls are available today for low-cost production. But the modern equipment must have constant voltage, constant frequency and uninterrupted power to function and it is designed for 60 cycles. When a series of rolls in a mill must hold relative speeds to, say, small fractions of a cycle, power supply from the old pole-slipping, oscillating blast-furnace gas-engine plants is just out of the question. These have served their time. Steel officials also are saying as a matter of policy that they wish to buy power from utilities.

Here opens an opportunity for utility management. Heretofore no utility could work out a satisfactory parallel operation with 25-cycle steel mills having gas-engine plants. Now there is the prospect that more promising arrangements can be worked out with a 60-cycle power supply in conjunction with a boiler-turbine utilization of blast-furnace gas as an alternative to blast-furnace gas engines. The steel mill load in the modernized plant will have more favorable characteristics. The blast furnace waste gas could thus be used in an auxiliary or supplementary power plant which might well, in many instances, be owned or operated by the utility. Continued and expanded modernization of steel plants should mean good business for utilities if power salesmen are alert to the opportunities.

Creative Selling Will Build Good Will for Fluorescent

WHEN fluorescent lighting was introduced its sponsors offered it as a new tool for decorative lighting, as a cool light, as a color-matching unit and, because of its characteristics, as a means whereby higher levels of illumination could be secured with comfort. In spite of its greater efficiency, it was not expected to cut load, but to build lighting values.

If the sales of this new illuminant could have been kept within the boundaries enumerated it is barely possible that greater progress could have been made even in this short time. It has been unfortunate that so much emphasis has been placed upon the efficiency of the lamp, because in so doing the natural tendency has been to offer it in place of incandescent, not wattage for wattage, but foot-candles for foot-candles.

To substitute the new lamp for incandescent without substantially improving the customer's lighting does no one any good. The customer may think he is saving money, but analyses published in this magazine show that after considering all costs there is seldom any saving at present prices. The manufacturer does not gain and the utility sells less energy.

There are several recognized markets for this new lamp, one of which is increasing the illumination to levels beyond that comfortably attainable with incandescent. There is sufficient opportunity for sales in the markets where fluorescent has something positive and constructive to offer.

No one questions the future of fluorescent. Its use is going to grow. The speed with which it develops will naturally depend to a considerable extent upon the sales effort and good will of the utilities, and this can be gained quickest by directing sales in channels that are creative.

Information Pleas

By CARTER FIELD

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

INFORMATION, PLEASE! That's what the government demands, with the "please" generally omitted. Demands with boring duplication, constant repetition, requirements that reports be printed, and at terrific cost both to the corporations, which means of course customers as well as stockholders, and to the government itself.

"I figure it costs them $5 to answer the questions that it costs us $1 to prepare," said an old official of the Federal Power Commission. He was talking about the questionnaires and reports that the various government agencies, federal and state, require of corporations. He was speaking particularly of electric companies, because primarily that is the interest of the Power Commission.

Let's look at a particular case: For the twelve months ended September 1, 1938, the Philadelphia Electric Company System had these little chores to do for the federal government alone:

	Reports Filed		Exhibits and Supplements Filed		Approximate Minimum Cost
	Number	Pages	Number	Pages	
Periodic and special reports ..	325*	2,266	195	1,221	$25,516
Tax and tariff filings	1,520	6,856	....	....	33,580
Registration statements	5	406	131	13,225	256,249
Totals	1,850	9,528	326	14,446	$313,345

* This item represents filing of 30 individual federal report forms and fourteen special reports where no forms are provided by federal agencies.

Mind you, this does *not* include all the reports which this particular corporation had to worry over and make out to state and local agencies! And it was *not* an extraordinary year. Just normal.

Now it is simply impossible for any corporation to determine what this really costs. It is simple to figure out that so many working hours of clerks paid so much were used and add the cost of the stationery and ink. It might even be possible to include something for rent of the quarters which the clerks engaged on this work use, though so far as the writer can find this has never been done.

But there is no way of figuring in the time spent on these things by the big executives, the "idea" men of the companies. They can delegate the clerical work and the computations and the map drawing—how the federal statistical agencies do love maps, especially nice, expensive printed ones—but they cannot delegate their responsibility.

For example, the Federal Power Commission wants a special report, which must be made out just for it—not a carbon of the same general information just given the state rate-making authority, or the War Department, or the Internal Revenue Bureau, or the Securities and Exchange Commission. It must in every case be made up entirely differently. Nobody knows just why, but it wants all the answers stated and tabulated along a unique line conceived by its own experts.

The president of the company, the general manager, all the officers and experts and lawyers are on pins and needles about it. They know that it must jibe precisely and exactly with every other report in different form sent to every other federal and state agency, and with the annual report made to the stockholders. Then they must scrutinize it with a microscope lest there be some little detail there which might be twisted and perverted by the public ownership crowd on Capitol Hill.

But this isn't for Congress, is it? Congress makes its own inquiries, by committees.

Well, some congressmen would have trouble getting at something they wanted in these reports. For instance, John Rankin arises in the House, or George Norris in the Senate, and says something which provokes an anti-public ownership member to reply. Suppose the latter uses any specific data in his answer. It may affect a company in his district or state which he knows something about.

An army of clerks, scattered through the inquisitorial bureaus, spring to action, galvanized by a frantic telephone call from the public ownership solon. Within half an hour an extraordinary mass of data about the company involved is laid on his desk. That's one time there better not be any discrepancies! Or anything that can be twisted!

"It is estimated," says T. W. Neel of the Philadelphia Electric Co., "that the (electric) industry's cost of making reports to federal agencies ranges from $10,000,000 to $15,000,000 a year. This does not include costs of state reports."

Mr. Neel inquires why it should be necessary, in one year's time, to report the name, title and address of officers and directors (to the federal agencies alone) five times, to repeat the compensation of officers and directors four times, to furnish the company balance sheet seven times, the authorized capital stock five times, and to supply maps of the area served and the location of the properties five times!

But there is no doubt whatever that Mr. Neel's estimates as to the money cost—to say nothing of depriving the companies of the time and energies of their executives, their trips to Washington, with loss of time and money, etc.—are very low. It seems that even doubling them, to allow for reports to state and local governmental bureaus, would not be enough.

But let's consider another angle. Assume $15,000,000 is right for the electric companies on federal reports alone. The government spends one dollar for every five the companies spend. So that costs the government $3,000,000 in cash. But the government collects corporation income taxes, and money wasted by the companies in duplicating work on reports comes right off the top. Next year

[*Continued on page 98*]

NEWS OF THE WEEK

Kellogg Disputes Healy on Dividend Arrearages

E.E.I. president declares unpaid preferred dividends of utilities is due in part to government policies and economic conditions — Cites sharp rise in taxes and reduction in utility rates

Economic and governmental conditions which the public utilities have been forced to face since 1932 were the factors which caused the piling up of preferred dividend arrearages, Charles W. Kellogg, president of the Edison Electric Institute, said in taking direct issue with Robert E. Healy of the Securities and Exchange Commission.

In a recent address before the Harvard Business Alumni Association, Mr. Healy declared that there were aggregate arrearages in preferred dividends of some $96,000,000 in operating utility companies and $337,000,000 in utility holding companies as of January 1, 1938. He declared that "as long as such accumulations of arrearages remain uncorrected it is idle to talk about an equity capital market in the public utility industry."

Cites Present Conditions

Mr. Kellogg remarked that "utilities today, even where all preferred dividends have been paid, cannot sell their common stocks at the property values they represent. He said that these preferred dividend arrearages are only a "symptom of a general condition" and outlined the following five reasons in explaining the present situation:

1. Taxes paid by electric utilities since 1932, principally due to increased federal taxes, exceed what they would have been at the 1932 ratios by a cumulative amount of $297,000,000. This is nearly 70 per cent of the combined arrearages cited by Judge Healy.

2. Since 1932 over $177,000,000 has been taken out of earnings or cash assets for new construction. This amount would have been available for dividends if it had been feasible for utilities to raise funds by the sale of securities.

3. Rates, following a long-time trend, have been progressively lowered, but since 1932, under the pressure of subsidized government competition, have been reduced somewhat at the expense of the stockholder. The difference between domestic revenues actually received since 1932 and what they would have been at the rate prevailing in that year makes a cumulative total of $479,000,000. Very substantial reductions also have been made to other customer classes.

4. A substantial part of accumulated unpaid preferred dividends by operating utilities represents cash expended for retiring maturing obligations. In the case of one operating company, representing one-tenth of the total preferred arrearages of such companies, the entire arrearage is accounted for by such debt payments. This was necessitated by the fact that even bonds of the company in question could not be marketed at any price which a commission could approve.

5. A considerable part of the preferred dividend arrearages of electric utilities arises from the fact that their operations combined with street railway operations, which have suffered losses from reduced traffic and higher labor costs.

Mr. Kellogg said that since 1932 the operating utilities have paid out in interest and dividends $4,565,000,000, and the $96,000,000 accumulation of unpaid dividends is only about 2 per

HOME SERVICE GRADUATES—Utility representatives and home service girls at the summer training school at the Westinghouse Institute at Mansfield, Ohio

L. to r.—Virginia Lee Coate, Municipal Electric Light & Power Co., Richmond, Ind.; Mrs. Art Wise, Riggs Electric Co., Akron, Ohio; Betty Clark, Columbus & Southern Ohio Electric Co., Columbus, Ohio; Mrs. Julia Kiene, head of the institute; Dorothy Trowbridge, Ohio Edison Co., Youngstown; Catherine Harlow, Marion Reserve Power Co., Rittman, Ohio; Evelyn Rankin, Ohio Public Service Co., Alliance; Mrs. F. L. Hoffman, Riggs Electric Co., Akron, Ohio, and Marie Combiths, Commonwealth Edison Co., Chicago

cent of this total. The combined arrearages is only about 10 per cent.

It was pointed out that general economic conditions and government attacks on the industry were responsible for depressed market value of equity securities. A change in this attitude should have a stimulating effect on utility equities, Mr. Kellogg declared.

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Prudent Investment Difficult in Brazil

The "prudent investment" theory of utility rate making must be predicated on a stabilized national currency, the Brazilian government commission has been advised by Oswald Ryan, member of the Civil Aeronautics Authority and former general counsel of the Federal Power Commission.

Observers have interpreted the advice of Mr. Ryan to mean that substitution of "prudent investment" rate-making rule for the doctrine of "fair value" or "present value" would be difficult in Brazil, where currency depreciation has been sizable. Private utilities, which are financed to a great extent by American capital, have opposed the prudent investment method for Brazil.

The opinion of Mr. Ryan was given in response to a request of the commission appointed by the President of Brazil to draft regulations for the control of privately owned utilities in the country.

Mr. Ryan, who has advocated prudent investment for American utilities, favored the method where there is a relatively stable currency, but "in the event of an extraordinary price upheaval, which would result in a radically changed level of a more or less permanent character, it would become necessary to establish a new rate base."

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Pacific Gas & Electric Ordered to Hold Election

The NLRB has ordered the Pacific Gas & Electric Co. to stop alleged interfering with self-organization of its employees and to post, cease and desist notices of such action. At the same time the company was directed to hold a secret election to determine whether employees desire to be represented by the Utility Workers Organizing Committee (CIO), by the California Gas and Electric Employees Union, or by neither.

The board set aside an election held in December, 1937, which resulted in a count of 3,550 for the employees' union to 2,254 for the CIO, with 126 for neither. The board's action was based upon charges filed by the CIO.

Legislators Defeat Revenue Bonds Bill

Legislation designed to permit the California Water Authority to issue $170,000,000 of revenue bonds to assist cities and other political subdivisions to undertake municipal power distribution was defeated, 39 to 35, by the California Assembly during the closing hours of a hectic session of the Legislature. The bill had previously passed the conservative state Senate.

The stated purpose of the measure was to permit municipalities, counties and utility districts to receive state financing aid in contracting for and distributing power from the Central Valley project. Opponents claimed that it was a subterfuge to circumvent restrictions placed on revenue bonds by California voters when they overwhelmingly turned down a revenue bond proposal in the last general election. A similar measure had already been voted down by the California Legislature this year.

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Utility Workers Spurn AFL Union Appeal

Employees of the Union Electric Co. of Missouri answered the call of the AFL to join a labor union by asserting that for 25 years through the Employees' Mutual Benefit Association they had enjoyed "many benefits that no outside labor organization can offer."

The Building and Construction Trades Council of St. Louis and vicinity is attempting to organize the utility workers, including meter readers, truck drivers, office workers, laborers, cable men, garage men and power plant workers.

Officers of the employees' association asserted that there is no dissatisfaction among its members, who have enjoyed collective bargaining for more than twenty years.

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FPC License Safeguards Recreational Purposes

Providing that the licensee shall permit the development of reservoirs and streams by the Forest Service for recreational purposes to an extent not inconsistent with their use for power purposes and shall maintain a minimum flow for the preservation of fish life and the recreational value of the stream, the Federal Power Commission has authorized the issuance to the Nevada-California Electric Corp. of an amended license for the power development on Bishop Creek and its tributaries, Birch and McGee Creeks, in Inyo County, California, occupying lands within the Inyo National Forest and other lands of the United States.

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Orders Steam Unit for Braintree Plant

Braintree (Mass.) municipal light department has ordered a new steam turbo-generator from the General Electric Co., the specified delivery date being May 1, 1940.

The machine will bring the plant capacity to about 13,500 kw. and will operate at 3,600 r.p.m., the turbine rating being 9,375 kw. Operating steam pressure will be 425 lb. per sq.in. and the superheat 175 deg. F. Generation will be at 13,800 volts. At 70 per cent power factor the unit rates at 10,700 kva. Three 2,400-volt units, rated respectively at 500, 2,000 and 3,500 kw., are already in service at the plant, but the new unit will be utilized on base load operation.

Fred B. Lawrence, manager of the department, stated that in view of the additional boiler capacity installed about a year ago no present enlargement of the steam-generating facilities is contemplated. The contract for a condenser for the new unit will be awarded shortly.

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Redetermine Absolute Ampere, Using New Coils

Using improved coils, the absolute value of the ampere has been redetermined by the National Bureau of Standards and is expressed as 1 NBS international ampere equals 0.99986 absolute ampere.

Previous work indicated that improvements in the coils were required to make them more nearly fulfill the conditions assumed in developing the equations for computing absolute value of the ampere from the force measured by the current balance. New coils consisted of one moving coil in the form of a short solenoid and one moving coil and one pair of fixed coils wound from anodized aluminum ribbon in the form of a flat spiral.

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Affirms Strike Conviction

The State Supreme Court in Nashville has affirmed the conviction of D. L. Staley for cutting a power line pole of the Tennessee Electric Power Co. during a linemen's strike. The court reversed convictions of three co-defendants. Staley's penalty is $500 fine and eleven months and 29 days in jail.

Farmer Named President of A.I.E.E. at Coast Meet

Takes office August 1, succeeding John C. Parker — San Francisco convention draws engineers from all sections of the country — Electrical machinery committee presents report on air-cooled units

Electrical engineers from all sections of the country gathered this week in San Francisco for the combined summer and Pacific Coast convention of the American Institute of Electrical Engineers.

F. Malcolm Farmer, vice-president and chief engineer of the Electrical Testing Laboratories, New York, was elected president of the Institute to succeed John C. Parker, vice-president of Consolidated Edison Co. of New York, Inc.

Elect Officers

Other officers elected included: Vice-presidents, C. T. Sinclair, Pittsburgh; E. E. George, Chattanooga, Tenn.; Albert L. Turner, Omaha, Neb.; H. W. Hitchcock, Los Angeles, and J. M. Thomson, Toronto. Directors elected were: Mark Eldredge, Memphis, Tenn.; R. E. Hellmund, East Pittsburgh, Pa., and Frank J. Meyer, Oklahoma City, Okla. W. I. Slichter, New York, was re-elected national treasurer. These officers, together with the hold-over officers, will constitute the board of directors for the next administrative year, which begins August 1.

The annual report of the board, presented at the annual meeting, showed a total membership on April 30 of 16,605. In addition to the three national conventions and three district meetings, 1,825 meetings were held during the year by the local organizations of the Institute in the United States, Canada and Mexico.

F. Malcolm Farmer

Of especial interest to the gathered engineers was the report of the electrical machinery committee. The advantages of hydrogen cooling, especially for the lighter weight, faster-running 3,600-r.p.m. turbo-alternators, are confirmed in a list embraced in the report. Of the 58 two-pole units, totaling 1,958,500 kw., it is reported that 33, totaling 1,363,500 kw., have been ordered or installed with hydrogen cooling. During the same interval since 1937 there have been seven machines of the 1,800-r.p.m. speed class totaling 519,000 kw., and these range from 54,000 to 150,000 kw. rating.

The accompanying table shows the number of air-cooled 3,600-r.p.m. turbo-alternators on order or installed since 1937.

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Pennsylvania High Court Hears Foreign Tax Case

The Pennsylvania Supreme Court has taken under advisement the plea of Attorney-General Claude T. Reno for reversal of a Dauphin County court decision invalidating the 1935 foreign corporation franchise tax. The levy, made against out-of-state firms, involves approximately $35,000,000. The tax was expected to yield $14,000,000 for the biennium which began June 1. Columbia Gas & Electric Corp. successfully contested the constitutionality of the tax in the lower court. Columbia appealed from the initial assessment of $192,193 made against it in 1935.

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Plan Hearings on Wages

The Public Contracts Board, Department of Labor, will hold a hearing on July 6 to take testimony upon which findings of fact will be made to determine the prevailing minimum wages in the electrical and radio industry.

Air-Cooled 3,600-R.P.M. Turbo-Alternators

No.	Kva.	Kw.	Customer	Manufacturer	Date Installed
2	25,000	20,000	Louisiana Steam Products Co.	W.E.&M. Co.	1938
1	29,500	25,000	Connecticut Lt. & Pr. Co.	W.E.&M. Co.	1938
1	31,250	25,000	Gulf States Utilities	W.E.&M. Co.	1938
1	25,000	20,000	Kansas Gas & Elec. Co.	W.E.&M. Co.	1938
1	37,500	30,000	Boston Edison Co.	W.E.&M. Co.	1939
1	25,000	20,000	Metropolitan Edison	W.E.&M. Co.	On Order
1	43,750	35,000	Iowa Pr. & Lt., Des Moines	Allis-Chal.	1938
1	31,250	25,000	Cent. Ill. Pr. & Lt. Corp.	Allis-Chal.	1938
1	25,000	20,000	So. Ind. Gas & Electric	Allis-Chal.	1938
1	25,000	20,000	Madison Gas & Electric	Allis-Chal.	1938
1	18,750	15,000	City of Springfield, Ill.	Allis-Chal.	1938
1	31,250	25,000	Cent. Ill. Pub. Service	Allis-Chal.	On Order
1	31,250	25,000	Public Serv. of Colorado	G.E. Co.	1937
1	28,571	20,000	United Pr. Mfg. Co.	G.E. Co.	1937
1	25,000	25,000	Monongahela W. Penn. P. S. Co.	G.E. Co.	1937
1	25,000	20,000	N. Y. State Elec. & Gas Corp.	G.E. Co.	1938
1	50,000	40,000	Hartford Elec. Lt. Co.	G.E. Co.	1938
1	25,000	20,000	Ohio Edison Co., Mad River	G.E. Co.	1938
1	37,500	30,000	Potomac Edison Co.	G.E. Co.	1938
1	25,000	20,000	Public Serv. Co. of N. H.	G.E. Co.	1938
1	25,000	20,000	Public Serv. Co. of Okla.	G.E. Co.	1938
1	42,857	30,000	City of Jacksonville, Fla.	G.E. Co.	1939
1	28,571	20,000	Houston Lt. & Pr. Co.	G.E. Co.	1939
1	31,250	25,000	Consol. Gas E. L. & Pr. Co.	G.E. Co.	On Order

Hydrogen-Cooled 3,600-R.P.M. Turbo-Alternators

No.	Kva.	Kw.	Customer	Manufacturer	Date Installed
1	50,000	45,000	West Penn Pr. Co.	W.E.&M. Co.	1938
1	58,889	53,000	Consolidated Edison Co.	W.E.&M. Co.	1938
1	58,750	50,000	Philadelphia Elec. Co.	W.E.&M. Co.	1938
1	43,750	35,000	Cincinnati Gas & Elec.	W.E.&M. Co.	1938
1	81,250	65,000	Consolidated Edison Co.	W.E.&M. Co.	On Order
1	43,750	35,000	Penna. Power Co.	W.E.&M. Co.	1939
1	32,750	35,000	Columbus & So. Ohio Pr. Co.	W.E.&M. Co.	1939
2	43,750	35,000	Georgia Pr. Co.	W.E.&M. Co.	On Order
1	43,750	35,000	Penna. Electric Co.	W.E.&M. Co.	On Order
1	18,750	15,000	Wisconsin Elec. Power Co.	Allis-Chal.	1938
1	31,250	25,000	City of Lansing, Mich.	Allis-Chal.	On Order
1	31,250	25,000	Dayton Pr. & Lt. Co.	G.E. Co.	1937
1	50,000	40,000	Am. G. & E. Co., Logan, W. Va.	G.E. Co.	1937
2	66,667	60,000	Am. G. & E. Co., Windsor, Sta.	G.E.Co.	1—1939
				G.E. Co.	1—On Order
1	58,889	53,000	Consol. Edison Co. of N. Y.	G.E. Co.	1938
1	37,500	30,000	New Orleans Pub. Serv. Co.	G.E. Co.	1939
1	55,555	50,000	Pub. Serv. Elec. & Gas Co.	G.E. Co.	1938
3	43,750	35,000	Consumers Pr. Co.	G.E. Co.	On Order
1	28,125	22,500	Indiana & Mich. Elec. Co.	G.E. Co.	On Order
3	50,000	40,000	Pacific Gas & Elec. Co.	G.E. Co.	On Order
1	50,000	40,000	Virginia Elec. Pr. Co.	G.E. Co.	On Order
2	50,000	40,000	Duke Power Co.	G.E. Co.	On Order
2	62,500	50,000	Pub. Serv. Elec. & Gas Co.	G.E. Co.	On Order
1	62,500	50,000	Philadelphia Elec. Co.	G.E. Co.	On Order
1	81,250	65,000	Consol. Edison Co., N. Y.	G.E. Co.	On Order

1,800-R.P.M. Turbo-Alternators

No.	Kva.	Kw.	Customer	Manufacturer	Date Installed
1	75,000	60,000	Duquesne Lt. Co.	W.E.&M. Co.	1938
1	176,470	150,000	Chicago Dist. Gen. Corp.	G.E. Co.	1937
1	81,250	65,000	Cincinnati Gas & Elec. Co.	G.E. Co.	1938
2	68,250	55,000	Ford Motor Co.	G.E. Co.	1939
1	60,000	54,000	Indiana & Mich. Elec. Co.	G.E. Co.	On Order
1	100,000	80,000	Central N. Y. Power (Oswego)	G.E. Co.	On Order

Pins representing almost half a millennium of combined service were recently presented to a group of eighteen veteran employees of the New England Power Association and subsidiary properties by President Carl S. Herrmann at a gathering in Worcester.

Seated (l. to r.), with pin classifications by years in parentheses, are: J. P. McCann, safety manager (35); G. M. Hardy, superintendent of distribution, Worcester County Electric (45); President Herrmann, N.E.P.A.; A. S. Longley, retired (45); F. L. Ball, regional executive (35); P. L. Peterson, superintendent of maintenance, central division (30.

Standing, W. C. Ball, vice-president (20); H. W. Greenhalgh, general auditor (20); H. B. Shaftoe, assistant treasurer (35); J. L. Stetson, foreman Fifteen Mill Falls (20); E. M. Norwood, assistant treasurer Worcester County Electric (30); A. P. Nichols, central district treasury representative (25); Harry Hanson, treasurer N.E.P.A. (20); E. A. Dow, chief engineer (20); G. C. Steers, assistant auditor New England Power Service Co. (20); W. C. Coburn, assistant treasurer (25).

Others scheduled to receive pins, who were unable to attend the above gathering, were F. J. Dunn, vice-president and general counsel, N.E.P.A.; W. E. Casey, assistant to the general manager at Worcester, and L. P. Morris, general foreman New England Power Service Co.

Allot $460,000,000 for New Rural Plan

Chief impact on the electrical industry of President Roosevelt's new $3,860,000,000 plan for self-liquidating public works lies in the portion devoted to rural electrification. The new rural electrification program is intended to extend over seven years and to involve a total of $460,000,000; during the fiscal year 1939-40 about $20,000,000 would be loaned. This sum, the President says, would permit electrification of a maximum of 1,250,000 rural families not now receiving electric service. The regular REA appropriation of $40,000,000 was increased last year by $100,000,000; at the year end REA has allocated $139,368,927.

Exactly how and where this new sum of $460,000,000 is going to be used is not known, according to informants at REA's Washington headquarters, until requisite legislation is placed before Congress. The chief beneficiaries, however, among the 44 states to which the fund will be allotted are, it was stated, Texas, Indiana, Minnesota, Iowa, Georgia and Ohio. These five states have been the most active participants in the program to date.

The appropriation will make possible approximately 460,000 miles of transmission line. All of the 1938-39 appropriation—about $143,000,000—has already been earmarked for allotment to the various states. According to the statement given out at REA, applications have been received for a great deal more money than Congress has made available.

About one-half of this amount, or a little more than $71,000,000, will be paid out during the next fiscal year for projects now under way. In addition to the $71,000,000 which is already earmarked, and will be paid out next fiscal year, is the sum of $20,000,000 which the President mentioned in his recent announcement, and also $40,000,000 which is specified in the act itself.

The reason why so large a proportion of the total 1938-39 sum will be paid during the coming fiscal period, according to REA informants, is that the major part of the payments are not made until the projects are nearly completed, and a good deal of the construction work and installation of electrical equipment is not yet finished. Most of the work must be completed in advance, although allotments have been made by REA progressively as the work goes forward. Since the REA was established, in 1935, it has made allotments amounting to more than $229,218,000.

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Plan Seattle Bond Issue

Announcing that Seattle City Light will soon issue $600,000 in bonds in an expansion program and that millions of dollars will be needed eventually to complete Ruby Dam, Eugene R. Hoffman, lighting superintendent, has filed a letter with the City Council asking for an audit of City Light accounts. Mr. Hoffman said extension of lines and substation improvements would be financed by the $600,000 bond issue.

Gives Customers Single Meter Rate

Rate reductions amounting to $250,000 were made by the Washington Water Power Co. in schedules filed simultaneously at Olympia, Wash., and Boise, Idaho.

In discussing the lowered rates, Kinsey Robinson, president and general manager, said: "The company is making this rate reduction in anticipation of the satisfactory refunding of its bonds. Of importance to future development of electric service are the new single-meter residential rates, which include approved water heating for normal use at 7/10 of a cent per kilowatt-hour. These rates combine in a simple way all classes of household electric service and bring the cost of electric service to Washington Water Power customers to a point among the lowest in the United States."

It is expected, commented Mr. Robinson, "that more and more customers will take advantage of the single-meter residential rates. The company plans to encourage its adoption in the hope that a wider use of electric service may be enjoyed."

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WPA Purchases

Value of electrical machinery, apparatus and supplies purchased for WPA work projects from federal and sponsors' funds totaled $19,704,607 cumulative through March 31, 1939.

See Central Steam Units as Answer to Congestion

Electric utility executives express optimism about future of district steam heating — Believe steam distribution is a logical unit for utility system operating in a large city

Three electric utility executives expressed optimism about the future of district steam heating at the sales committee session of the National District Heating Association convention in New York this week.

Alex Dow, president of Detroit Edison and sole honorary member of the association, urged rates which would pay a return from the business, conducted to stand on its own legs. He said to count him out when intricate economic analyses came in and tried to prove a profitable by-product enterprise founded on a 4,000 B.t.u. kw.-hr. By-product steam or by-product electricity might come again as a justifiable approach and it did seem possible to him that bleeding power units for heating steam would also prove feasible some day.

See Higher Coal Prices

Higher fixed price of coal as a prospect for the fall could well be viewed as helpful to the steam heat business because the user is profoundly influenced by the price of coal, Mr. Dow declared. He insisted that the business was not worth while unless independently self-supporting and profitable.

H. B. Bryans, executive vice-president of Philadelphia Electric Co., reported that the experience of his company had shown that steam distribution business is a logical unit for an electric utility system operating in a big city. His company's present policy in regard to new business is founded on the fundamental precaution that all proposals for new service be carefully analyzed as to investment in production and distribution facilities.

Where the conditions surrounding the contract, such as high fixed costs, made it seem likely that the venture would prove unprofitable, Mr. Bryans said, there was no hesitancy in turning the prospective customer down even though such business might mean a boost in gross income. He said that his company had found that such rigid protection of its net income position has enabled it to show a gain in total steam sales and revenue for 1938 over 1937.

In time, said Floyd L. Carlisle, chairman of Consolidated Edison board, central steam service must be the answer for the congested communities if there is any truth to the "World of Tomorrow" depicted at the World's Fair. But a deterrent would be the persistence of government in charging a steam utility a tax 20 times as great as charged for the equivalent investment of a property owner in space and facilities devoted to heating. The future of steam heat is so assured, in his estimation, that it does not rest in itself, but in the return of government to the proverbial philosophy of expenditure and taxation.

As for the immediate future, Mr. Carlisle refused to believe the American people would throw away their democratic heritage even if a convulsion here should tend to follow a catastrophic European war. On the contrary, the stage is all set for a great revival of business that will affect all household utilities favorably when it comes.

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Appeal from Decision on City Plant Tax Law

Appeal testing the validity of a 1939 law which excludes municipally owned utilities from state and county taxation will be carried to the Indiana Supreme Court, officials of Montgomery County said, following a decision by Judge Edgar A. Rice in Circuit Court in Crawfordsville, Ind., upholding the constitutionality of the measure.

Judge Rice issued a restraining order to prohibit Montgomery County treasurer E. G. Chadwick from collecting 1938 taxes on the city's electric plant. The city had asked for the order. The law permitting the state and counties to tax municipally owned utilities was enacted several years ago and has since been the center of many legal battles, until the law was repealed at the past session of the Legislature.

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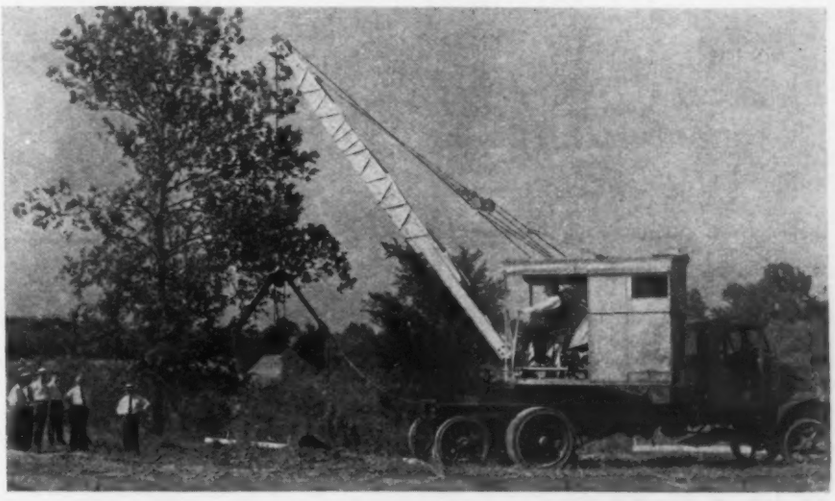
Illinois Utility Starts Work on New Plant

Construction of a new 25,000-kw. steam station by Central Illinois Public Service Co. got under way recently when President L. A. Magraw operated the steam shovel in excavating for the foundations. The new $3,500,000 station is scheduled to go into operation in the spring of 1940.

The order for the turbo-generator unit for the station near Hutsonville was recently placed with Allis-Chalmers Manufacturing Co. The new station will be connected to key points on the system by a new 65-mile, 66-kv. transmission line which is also part of the construction program.

Located on the west bank of the Wabash River on a 200-acre tract, the station is designed for an operating steam pressure of 650 lb. per square inch and 850 deg. F. temperature. The main equipment will consist of two high-pressure, high-temperature boilers of 150,000-lb.-per-hour steam capacity each and fired by twin pulverized fuel equipment.



GROUND BREAKING—President L. A. Magraw of the Central Illinois Public Service Company deftly clamshells the first dirt in the excavation for the foundations of the company's new $3,500,000 power station near Hutsonville. This operation started construction of the first complete power plant to be built in Illinois in eleven years

Engineers Meet for Economic Conference

The interrelations of business and government formed the general theme for the ninth annual Economics Conference at the Stevens Institute of Technology engineering camp, Johnsonburg, N. J., June 24 to July 3.

The patent system was seen as the focal point in the contest between business and government by Alan N. Mann, New York attorney. Reforms in the patent document were advocated by Richard Eyre, chairman of the advisory council to the patents committee of the House of Representatives, who said: "I want to bring about such changes in the document that you engineers can read it and know what the invention is that the patent seeks to cover."

Declaring that the co-operation of business, government, labor and farmers would set up a program of full production and full employment, Mordecai Ezekiel, economic adviser to Secretary of Agriculture Wallace, added that until this was achieved productive activity should be developed by wiser choice of price, wage and production policies.

During the sessions on labor relations W. D. Weed of the General Electric Company described community industrial surveys made by his company in each district where it has plants to determine the prevalent rate of pay for each type of job.

Attendance at the conference, which included approximately 150 engineers, economists and business men, was slightly under last year's. The conference was called by the Stevens Institute of Technology, the management division of the American Society of Mechanical Engineers and the New York section of the American Institute of Mining and Metallurgical Engineers.

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Kansas Utility Group Appeals NLRB Order

The decision of the NLRB ordering the Kansas City Power & Light Co. to disestablish the Association of Employees and invalidate its closed shop contract with the association will be appealed by both the company and the employees' association.

The board alleges that the association is company dominated and that an election should be held to determine if the employees in the production department desire to be represented by the IBEW, the AFL union filing the charges against the association.

The company's contract with the association is held to be invalid by the NLRB, which ordered the company to reimburse employees for amounts deducted from their wages under the check-off provision of the contract which was made July 3, 1937, and was to run for three years. The closed shop provision was effective on November 1, 1937.

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Approves Line Transfer

Upon joint application filed April 19 by West Coast Power Co. of Portland, Ore., and the city of Cascade Locks, Ore., the Federal Power Commission has approved the transfer from the company to the city of license as amended for the transmission line, affecting the lands of the United States within the Mt. Hood National Forest, the license for which was issued in 1934 for a period of ten years to the West Coast company and later amended.

MEETINGS

Economics Conference for Engineers — Annual meeting, Stevens Engineering Camp, Johnsonburg, N. J., June 24-July 3.

International High-Tension Conference—Bi-annual meeting, Paris, France, June 29-July 8. F. Attwood, president American National Committee, Ohio Brass Co., New York, N. Y.

American Society of Heating and Ventilating Engineers—Semi-annual meeting, Mackinac Island, Mich., July 4-6. Society Headquarters, 51 Madison Avenue, New York, N. Y.

American Society of Mechanical Engineers—Semi-annual meeting, San Francisco, Calif., July 10-15. C. E. Davies, national secretary, 29 West 39th St., New York, N. Y.

American Transit Association—Annual convention, Los Angeles, Calif., August 10-11; San Francisco, August 14-15. Charles Gordon, managing director, 292 Madison Av., New York, N. Y.

International Association of Electrical Inspectors—Joint annual meeting, northwestern and southwestern sections, Hotel Empire, San Francisco, Calif., August 14-18; western section, Hamilton, Ont., September 11-15; southern section, Asheville, N. C., September 18-22.

Illuminating Engineering Society—Annual meeting, Fairmont Hotel, San Francisco, Calif., August 21-25. Howard M. Sharp, general secretary, 51 Madison Avenue, New York, N. Y.

National Association of Railroad and Utilities Commissioners — Annual meeting, Seattle, Wash., August 22-25. Clyde S. Bailey, secretary, New Post Office Bldg., 12th and Pennsylvania Avenue, Washington, D. C.

Maryland Utilities Association—Annual fall convention, George Washington Hotel, Ocean City, Md., August 25-26. J. H. Purdy, secretary, Lexington Building, Baltimore, Md.

Electrochemical Society—Fall convention, Hotel Commodore, New York, N. Y., September 11-13. Dr. Colin G. Fink, secretary, Columbia University, New York, N. Y.

Wisconsin Utilities Association—Annual convention, accounting section, Plankinton Hotel, Milwaukee, Wis., September 21-22. A. F. Herwig, executive secretary, Room 502, Brumder Bldg., 135 West Wells St., Milwaukee, Wis.

National Industrial Advertising Association—National conference, Hotel New Yorker, New York, N. Y., September 20-22. William H. Easton, chairman, publicity committee, 420 Lexington Av., New York, N. Y.

American Institute of Electrical Engineers—Great Lakes district, Minneapolis, Minn., September 27-29. H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

Carmody to Direct New Federal Agency

John M. Carmody, head of the Rural Electrification Administration, has been nominated by President Roosevelt to be administrator of the new Federal Works Agency, which on July 1 will absorb all the federal agencies principally concerned with construction or public works, as provided in the President's reorganization plan.

Mr. Carmody has been in the federal service since 1933. His first work was in connection with labor disputes as a member of the former National Labor Board and later as chairman of the Bituminous Coal Labor Board. He served as chief engineer of the Civil Works Administration and the Federal Emergency Relief Administration during 1933-34. For eight months ended in 1935 he was a member of the National Mediation Board, and in 1936 he was made deputy administrator of Rural Electrification. He became administrator a year later.

An industrial engineer by profession, he was for six years editor of *Factory* and for two years editor of *Coal Age*, both McGraw-Hill publications. The agency of which Mr. Carmody, if confirmed by the Senate, will take charge will have five major divisions, dealing, respectively, with roads, public buildings, housing, public works and relief work. No one has yet been named to succeed Mr. Carmody as head of REA.

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Cleveland Group Names Officers

At the recent annual meeting of the Cleveland Engineering Society the following officers took office to serve until the close of the 1940 annual meeting: George R. Canning, Ohio Bell Telephone Co., president; Charles H. Christian, Christian-Schwarzenberg & Gaede, architects, vice-president, and Harry L. Wilcox, assistant chief engineer Electric Controller & Manufacturing Co., treasurer. This was the sixtieth annual election of trustees and officers, the organization having been established in 1880.

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City Plant to Supply REMC

City officials at Washington, Ind., have signed contracts to provide electrical power to the Daviess-Martin counties REMC. The city will build a line from Washington to Montgomery and erect a substation near that town, with REMC connecting its lines at that point.

Output Mounts to New June Peak

Continuing the strong upward movement that has been in progress since the early part of May, the output of the electric light and power industry registered a further rise to 2,285,083,000 kw.-hr. in the week of June 24, according to the Edison Electric Institute. All earlier records for a June week were exceeded for the third consecutive time.

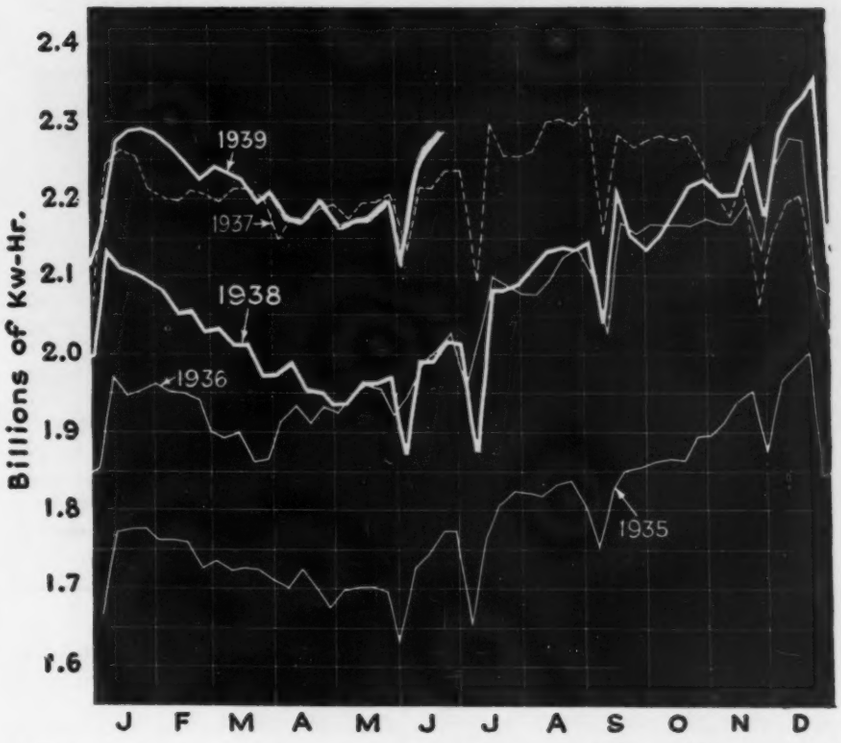
The gain over the preceding week was more than 20,000,000 kw.-hr. The corresponding figure for 1938 was surpassed by 13.2 per cent and that for 1937 by 2.1 per cent.

Weekly Output, Millions Kw.-Hr.

1939	1938	1937
June 24...2,285	June 25...2,019	June 26...2,238
June 17...2,265	June 18...1,991	June 19...2,214
June 10...2,257	June 11...1,992	June 12...2,214
June 3...2,114	June 4...1,879	June 5...2,131
May 27...2,205	May 28...1,973	May 29...2,207
May 20...2,170	May 21...1,968	May 22...2,199

Per Cent Change from Previous Year

Region	Week Ending June 24	June 17	June 10
New England	+12.2	+15.9	+11.8
Middle Atlantic	+10.3	+13.2	+12.7
Central Industrial	+16.1	+17.2	+17.5
West Central	+ 3.4	+ 6.2	+ 9.3
Southern States	+13.9	+13.6	+10.2
Rocky Mountain	+20.5	+13.7	+13.6
Pacific	+10.3	+ 9.9	+ 8.1
United States	+13.2	+13.7	+13.3



The greatest regional gains over a year ago were 20.5 per cent in the Rocky Mountain states, apparently indicative of greater activity in metal mining, and 16.1 per cent in the Central Industrial area, approximately balancing the loss in 1938 compared with 1937. Percentages in New England and the Middle Atlantic states diminished, but continued to outweigh losses in 1938 referred to 1937. Southern gains continue to grow.

Consolidated Edison to Open Two Drives

Plans have been completed for two campaigns during August, one on electric irons and the other on electric roasters, to be sponsored co-operatively by Consolidated Edison Co. of New York, Inc., and five manufacturers.

A $1 trade-in for old irons is the feature of the iron drive, which will feature the fully automatic new 1939 models. A total of $15,000 will be spent in newspapers from a joint fund contributed by the utility, General Electric, Westinghouse Electric & Manufacturing, Chicago Flexible Shaft, Proctor Electric and Knapp-Monarch.

The latest 1939 design electric roasters, capable of being used to cook an entire meal, will be featured. They will sell for $5 off the regular list price. For this drive $30,000 will be spent in newspapers from a joint fund contributed by Consolidated Edison, General Electric, Westinghouse Electric & Manufacturing, Schwartzbaugh Manufacturing Co. and National Enameling and Stamping Co.

Consolidated Edison will also distribute about one-half million postcards showing photographic reproductions in five colors of the system's "City of Light" exhibit at the World's Fair and calling attention to the campaigns. Each card has space for dealer's name and address. The company's approved dealers will take part in the campaigns.

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New Appliance Drive Started in Spokane

The Inland Empire Electrical Equipment Association, consisting of electrical dealers in the Spokane, Wash., area, are co-operating in a novel promotion plan to sell electric ranges. The plan is in the form of a contest and is based on "pet peeves" of the housewife.

Teaser ads challenging the public to the effect that humans are poor observers will be run with proof offered by way of questions, which lead to ones pertaining to the kitchen. Contestants are required to submit a pet kitchen peeve, which gives the salesman information in making a sale.

Nine electric ranges are to be given as prizes during the contest. Six minor prizes are to be awarded also. The Washington Water Power Co. contributes a souvenir recipe binder to all contestants. Winners are announced each week on the radio and in newspapers.

Hood River County Votes to Form PUD

Hood River county, Ore., voters voted 1,307 to 1,240 in favor of establishing a public utility district. This is the first district voted since the passage of the present Oregon law. The county is in the territory of Pacific Power & Light Co.

The town of Hood River rejected the formation of the district 555 to 385, while outside the town in eleven voting precincts, containing most of the county's rural population, which had been combined into three precincts for this election, the vote was 922 to 685 in favor of forming the district.

The fact that the vote was divided leaves some doubt as to whether the district can legally be formed. Some opinion is that a PUD without the town is not the proposition originally voted upon, and that the district fails when any part excludes itself.

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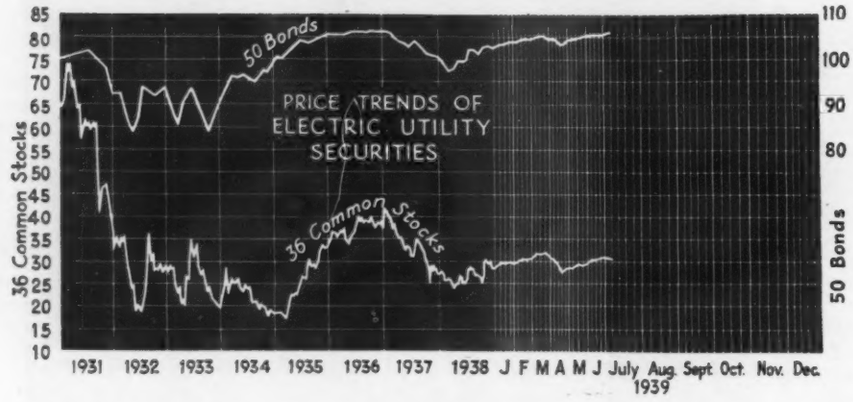
Okonite Gets Cable Order

The Okonite Co., Passaic, N. J., has been awarded a contract by the Navy Department for cable, amounting to $10,008.

Electric Utility Stocks Dip in Week


50 Bonds
PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
36 Common Stocks
36 Common Stocks
50 Bonds
1931 1932 1933 1934 1935 1936 1937 1938 J F M A M J July Aug. Sept Oct. Nov. Dec. 1939

While they closed higher on last Tuesday, electric utility common stocks were lower for the week, with the "Electrical World" index dipping 0.4 point to 30.6; index a year ago, 26.8. The bond index gained 0.1 point to 105.6, the mark of two weeks ago

Utilities Offer Large Bond Issues

Two utility companies placed on the market this week large bond issues. The Gulf States Utilities Co. made an offering of $27,300,000 of first mortgage and refunding 3½ per cent bonds, series D. The bonds were priced at 106¾ and accrued interest from May 1 last.

By means of a prospectus the Washington Water Power Co. made an offering of $22,000,000 of first mortgage 3½ per cent bonds due in 1964. The bonds were priced at 105 and accrued interest.

A new issue of $8,323,000 Rochester Gas & Electric Corp. general mortgage 3¼ per cent bonds, series J, due 1969, was offered at 105½ and interest last week. The entire net proceeds will be used for the redemption on September 1 of $8,323,000 general mortgage 30-year 5 per cent bonds, series A, of the company, due 1962.

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Refinancing Plan Approved by Board

Authorization for refinancing operations of the New York State Electric & Gas Corp., involving $13,000,000 in first mortgage bonds and $6,000,000 in capital stock, has been given by the state Public Service Commission.

The corporation was authorized to issue $13,000,000 in first mortgage bonds, 3¾ per cent series, due 1964, in exchange for the same amount of 4 per cent series due 1965. An issue of $6,000,000 of 5½ per cent cumulative preferred capital stock also was authorized, to consist of 60,000 shares of $100 par.

Of the capital stock issue, 30,724 shares are to be issued in exchange for 33,796 shares of outstanding 5 per cent preferred capital stock held by affiliated interests and 29,276 shares are to be sold at not less than par and accrued dividends, to realize not less than $2,810,496. The bond issue is to be dated May 1 and must be sold by July 31.

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Vote Dividends on Arrears

Florida Power & Light Co. has voted accumulations of $1.31 a share on the $7 preferred stock and $1.13 a share on the $6 preferred stock, both payable July 1 to stockholders of record June 20.

Iowa Southern Utilities Co. has declared a payment on account of dividend arrears on the former cumulative preferred stock of the company outstanding on August 3, 1938, at the rate of $1.75 per share for the 7 per cent series, $1.62½ per share for the 6½ per cent series and $1.50 per share for the 6 per cent series, payable on July 1 to holders of record on June 15, 1939, of dividend arrears certificates.

Directors of Central Maine Power Co. have declared diivdends of $2.25 a share on the 6 per cent preferred and preferred stock, $6 dividend series, and $2.62½ per share on the 7 per cent preferred stock. These declarations are equal to 1½ of the full quarterly dividends. Officers of the company stated that the directors in declaring this additional amount of dividends in arrears were influenced by the trend of earnings of the company for the past twelve months and by its cash position on May 31, 1939.

New England Power Association has announced the declaration of a dividend of $1 a share on the 6 per cent preferred stock and a further dividend of 50 cents a share in part payment of accrued and unpaid dividends. In addition, a dividend of 33 1-3 cents a share and a further dividend of 16 2-3 cents on account of arrears were declared on the $2 dividend preferred stock.

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Utilities File New Securities with SEC

West Penn Power Co. has filed a registration statement with the SEC, covering 297,077 shares of $100 par value 4½ per cent cumulative preferred stock. The registration statement states that simultaneously with the issuance of the stock provision will be made for the retirement on or before February 1, 1940, of all of the company's outstanding 6 and 7 per cent cumulative preferred stocks. It is also stated that the company proposes to issue 10-year promissory notes to effect the retirement of the 6 per cent and 7 per cent preferred stocks.

Wisconsin Gas & Electric Co. has filed an application for exemption or a declaration under the Holding Company Act in connection with the proposed issue and sale of not more than 46,480 shares of 4½ per cent cumulative preferred stock, $100 par value, and a maximum of $1,500,000 of 2¾ per cent promissory note.

Kansas Power Co. has filed a declaration, covering the proposed issue and sale of $5,000,000 of 4 per cent first mortgage bonds, Series A, due July 1, 1964, and a maximum of $600,000 unsecured notes.

Illinois Iowa Power Co. has filed notification of registration under the Holding Company Act.

SEC has made effective a declaration by the Oklahoma Power & Water Co., a subsidiary of the Middle West Corp., covering the issuance and sale to certain banks of $2,000,000 of 3¾ per cent serial five-year notes and the issuance and pledging as security for the notes of $2,500,000 of the declarant's first mortgage 5 per cent bonds. Proceeds from the notes, together with other funds, will be used to redeem $2,000,000 of the declarant's outstanding first mortgage 5 per cent two-year gold bonds.

Utility Reports

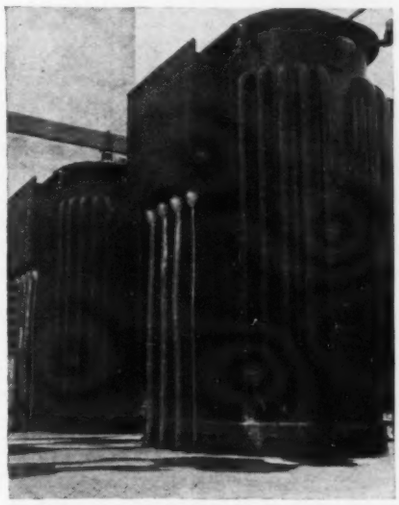
	Net Income 1939	1938
*Alabama Power	$3,873,313	$3,464,824
*Commonwealth & Southern and subs.	14,144,129	12,794,162
*Connecticut Lt. & Pwr.	3,765,692	3,586,960
*Consumers Pwr.	9,073,297	9,614,823
*Georgia Pwr.	5,374,124	4,368,893
†Louisville G. & E. (Del.) and subs.	1,232,735	1,523,806
*National Pwr. & Lt. and subs.	7,976,538	8,644,758
*Ohio Edison	4,126,926	4,069,327
‡Philadelphia Co. and subs.	5,310,425	6,524,964
*Pub. Serv. Corp. N. J. and subs.	24,483,563	22,819,715
*Tampa Electric	1,490,465	1,519,940
*Washington Water Pwr. and subs.	2,747,912	2,450,813

*Twelve months ended May 31.
†Twelve months ended April 30.
‡Twelve months ended March 31.

OPERATING PRACTICES

Wipe Cables Direct to Station Transformers

A number of economies were realized in the installation of two station-service transformers recently in following a scheme worked out by the Pacific Gas & Electric Company



Secondary side of transformers

Showing 240-120-volt lead-covered secondary leads, wiped directly to transformer nipples and carried straight to conduit. The 12-kv. primaries are similarly handled.

engineers. The transformers are each three-phase, oil-insulated, self-cooled, outdoor type and are provided with cable boxes supplied with wiping nipples.

The 12-kv. primary leads and the 240-120-volt secondary leads are paper-insulated, lead-covered cables. These are wiped directly to the nipples on the transformer cable boxes.

The use of three-phase transformers instead of single-phase units made possible this arrangement, by which a safe installation was attained. Furthermore, the necessity for inclosing the transformers separately or for isolating their terminals by height was eliminated. No live parts are accessible—all being metal-inclosed and grounded.

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Light Finish Aids Board Visibility

By W. B. MORTON
Electrical Engineering Division,
Philadelphia Electric Company

The chief problem in control room lighting, particularly in stations where curved switchboards "wall in" the operator, is the sharp contrast between the dark switchboards and light walls and ceilings. Visibility of devices on miniature type control between the dark switchboards and a prevalent cause of eyestrain.

To remedy this condition in one station the black finish on the miniature switchboard has been removed and the panels refinished with an opalescent gray lacquer. The new finish has materially improved the visibility of devices and eliminated the eyestrain complaint from the sharp contrast of black boards and light backgrounds. The improvement is noticeable in the accompanying illustration. The photograph was taken during the repainting operation before the last black section had been finished in the light color.

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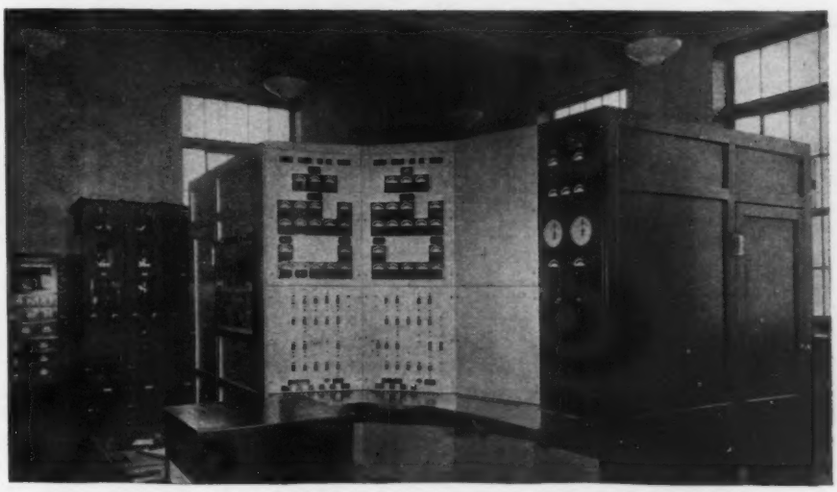
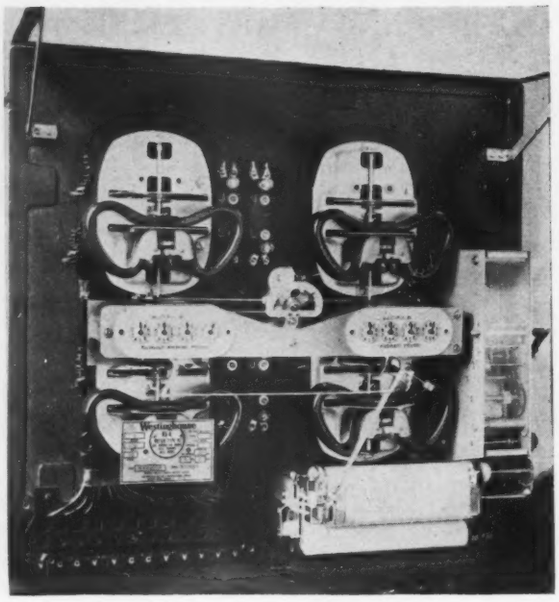
Totalizes Kva. Demand of Two Circuits

By W. J. CONSLER
Distribution Department,
Rochester Gas & Electric Company

Occasionally industrial and commercial loads are encountered which involve demand totalization and kva. summation because the two supplies used cannot be paralleled on a bus and the metering installed in the feed from the bus. The totalizations of the two circuits could readily be accomplished by simple application of the customary impulse totalization if only the total kw. demand or the total reactive demand were required. However where kva. demand is required these two values do not provide the



Not much doubt of the superior visibility of a light-surfaced control board



Meter sums two independent power circuits

Two meters on left are watt-hour meters, two on right are reactive meters. Pen arm is driven from the ball mechanism (center) in keeping with summated kva. During each return stroke a jog is made below the arc to indicate the integrated kw.-hrs.

true totalized value because they do not give the instantaneous values on which the kva. demand must be based and graphed.

In certain of these cases an 8-element Westinghouse RI kva. demand meter with a single kva. demand register has been used. Two pairs of polyphase elements with one reactiformer (for reactive phase-shift) are used to measure the kva. demand, kw. demand, kva.-hrs. and kw.-hrs. on one circuit. Two similar pairs of polyphase elements obtain the same information about the second circuit.

Since the two reactive meters operate on one shaft containing four disks and the two active meters operate on a second duplicate shaft, the RI ball mechanism and register is affected by the totalized reactive and active components of the two circuits, producing totalized kva. demand and other values inherent to the standard RI kva. demand meter.

Ingenious Aids to Transformer Testing

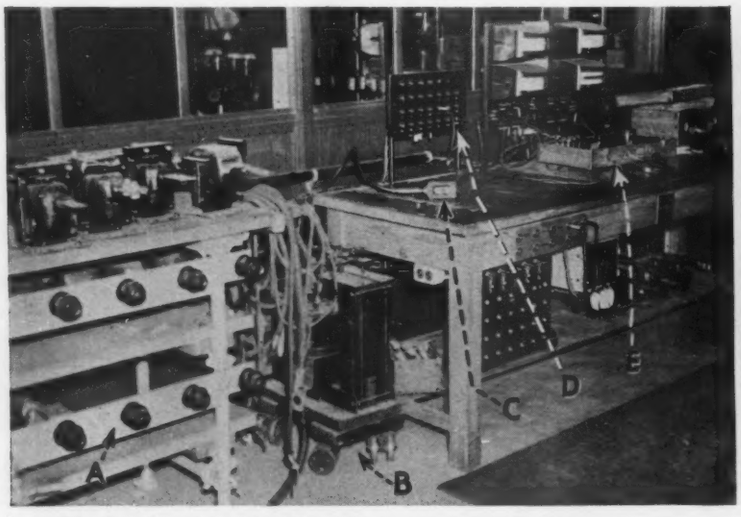
Several features contributing to flexibility, convenience and accuracy mark the instrument transformer test set-up at Springfield. These features include: (1) Use of a single regulator for varying primary voltage supplied to either the high-voltage insulation test or the loading transformers. (2) A detachable push-button control for the regulator that can be plugged into outlets at different test locations. (3) A loading transformer built from a discarded distribution transformer. (4) Rack-mounted current transformer standards. (5) Plug board for bringing out secondary leads of current transformer standards for convenience in testing.

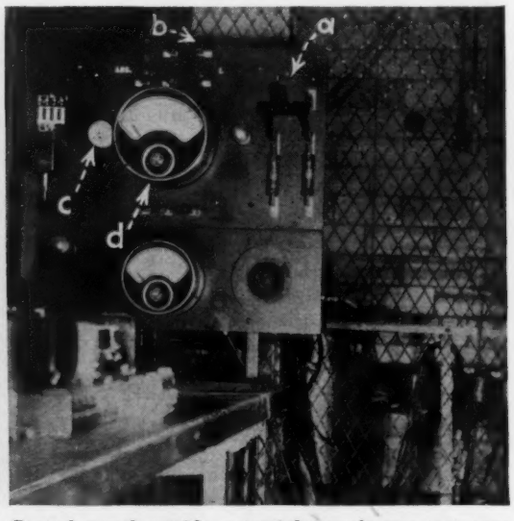
Supply to both test circuits is at 230 volts through an induction type voltage regulator which can be switched to either circuit as required. This regulator is continuously adjustable from 0 to 230 volts by means of a push-button control.

The push button is attached to the control by a length of rubber-covered cable fitted with a multiple prong plug that allows it to be readily plugged in at either the instrument transformer test positions or the high-voltage insulation test. A regulator was used in the supply circuit rather than a rheostat for two reasons: (1) Ease of control. (2) Lower energy consumption.

The loading transformer used in the current transformer tests consists of a 25-kva. distribution unit with both windings redesigned to give 5,000 amp. at 4 volts with secondary windings in parallel or 2,500 amp. at 8 volts with windings in series and 115 volts impressed upon the primary winding.

Rather than rely upon a single multiple range current transformer standard, failure of which might tie up all testing, this company preferred to use eighteen individual standard current transformers ranging in rating from 10 to 2,000 amp. For convenience these are mounted in a rack with one primary terminal connected to a common bus from one side of the





Ingenuity contributes to set-up for testing current transformers

Left—(A) Rack for mounting full range of standard "currents." Lugs ready for connection of current leads to test transformer. (B) Loading transformer (on casters) built from discarded 25-kva. distribution transformer. (C) Push-button control for adjusting regulator in primary of loading transformer. (D) Plug board where secondary leads from eighteen standard "currents" are brought out for use with standard Silsbee test equipment (E).

Control panel outside potential transformer test cage

Right—(a) Main switch, (b) Switch connecting regulator to either potential or current transformer test circuits. (c) Plug for push button control that adjusts regulator. Regulated voltage read on (d).

loading transformer secondary. The other terminals of all standards are brought out to studs from which heavy current loads can be attached to the loading transformer. Sufficiently accurate control of current during test is obtained by means of the regulator and the phase shifter furnished with a Silsbee set, eliminating the need for a heavy grid rheostat.

Secondary leads from the standard transformers are brought to a plug board on the test bench. Jumpers quickly and easily connect the proper transformer secondary with the Silsbee test set.

Weatherproof Wire and Cable*

Kansas City Power & Light Specifications

II—Covering

Copper conductors shall be covered by three (or two, if the purchaser so specifies) closely woven braids.

Outer braid shall be of at least two-ply cotton yarn.

Inner braids may be single-ply cotton yarn. Jute yarn may be used for inner braids, for wire No. 0 and larger.

Yarn used for the cotton braids shall consist entirely of long cotton fibre and shall be of good quality, well spun, and of a size commensurate with the size of the copper wire receiving the braids.

Yarn used for the jute braids shall be of good quality, well spun, and of a size commensurate with the size of the copper wire or cable receiving the jute braids.

Each yarn shall have not less than two ends. The method of braiding shall be such that equal number of ends of the same size is used in opposite directions.

Impregnation—The covering shall be impregnated with a black moisture-proof compound applied in sufficient quantity to saturate the covering. The saturation is to be so thorough that diagonal cuts through the covering down to the conductor shall expose no white or unsaturated ends. The saturating compound shall consist of an asphalt base of suitable consistency to fill all interstices of the covering. It shall be a non-conductor, insoluble in water, and of such quality and used at such temperature that its application shall not injure nor cause deterioration of the cotton covering, or the wire. The weather-proofing compound and finishing wax must be durable, insoluble in water and have a preservative quality against all bacterial life.

Finish—The saturated wire shall be coated with finishing wax and polished to form a hard smooth surface clearly showing the stitch of the braid. A tightly adhering wax coating is desired which will not crack, peel or fly off when the wire is bent, or scrape off when pulled over the crossarm during installation.

Thickness of Covering—The total thickness of the covering is to be considered as one-half of the difference between the diameter as measured over the braids and the diameter of the bare conductor, and must not be less than that given in the following table:

Size of Conductor Circ.mil	Thickness of Covering in 64th In.
1,000,000 or over	8
950,000 to 525,000	7
500,000 to 225,000	6
0000 to 1	5
2 to 10	4
11 to 14	3

Weight—The percentage by weight of cotton (or cotton and jute) to the total weight of covering, when three braids are specified, shall not be less than 30 per cent or more than 45 per cent.

Weight of the completed covering, including braids and compound, shall not vary more than 10 per cent over or under the weights shown in the accompanying table.

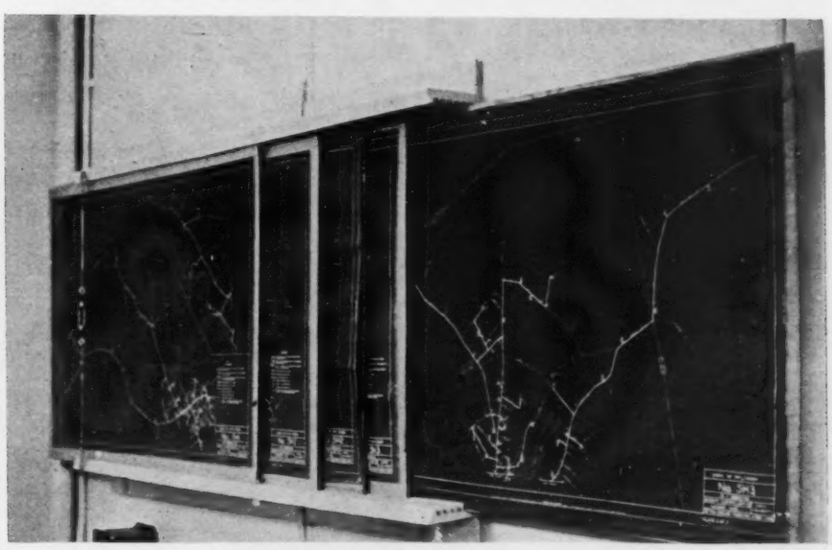
The purchaser shall not be required to pay for weatherproof covering in excess of the allowable variation, and may deduct from the manufacturer's bill for such excess at the price quoted for the finished wire.

Weight of Weatherproof Covering, Pounds per 1,000 Ft.

Conductor Size of	Stranded Conductor Double Braid	Stranded Conductor Triple Braid	Solid Conductor Double Braid	Solid Conductor Triple Braid
1,500 m.c.m.	454	744	..	..
1,250 m.c.m.	393	637	..	..
1,000 m.c.m.	364	582	..	..
900 m.c.m.	344	549	..	..
800 m.c.m.	325	518	..	..
750 m.c.m.	314	501	..	..
700 m.c.m.	306	485	..	..
600 m.c.m.	238	380	..	..
500 m.c.m.	220	349	..	..
450 m.c.m.	211	334	..	..
400 m.c.m.	200	317	..	..
350 m.c.m.	167	264	..	..
300 m.c.m.	157	248	..	..
250 m.c.m.	135	213	..	..
0000 A.W.G.	93	148	83	127
000 A.W.G.	88	137	80	121
00 A.W.G.	73	113	65	100
0 A.W.G.	64	100	58	88
1 A.W.G.	47	72	41	63
2 A.W.G.	43	67	38	59
3 A.W.G.	29	45	26	40
4 A.W.G.	28	43	25	38
5 A.W.G.	24	38	22	35
6 A.W.G.	23	35	21	33
8 A.W.G.	18	28	16	25
9 A.W.G.	..	..	14	22
10 A.W.G.	..	..	14	21
12 A.W.G.	..	..	10	15
14 A.W.G.	..	..	8	13
16 A.W.G.	..	..	8	12
18 A.W.G.	..	..	7	11
20 A.W.G.	..	..	6	9

*The second of a series of five covering specifications to get single conductor wire and cable that can be installed throughout the year and which will give reasonably long service.

System Diagrams Slide in Grooved Holder



A convenient wall-type holder for frequently consulted maps of the distribution system of the Amesbury (Mass.) Electric Light Company is used in the office of superintendent W. W. Tuxbury. The holder has a plywood back and a capacity of six maps, each groove being ⅜ in. wide x ½ in. deep. Over all, it is about 5 ft. long x 2 ft. 4 in. high. The left-hand end is stiffened by a turnbuckle brace rod. Maximum accessibility is combined with highly satisfactory preservation of maps

INDUSTRIAL ENGINEERING

Light hoods set at angle above layout table eliminate shadows

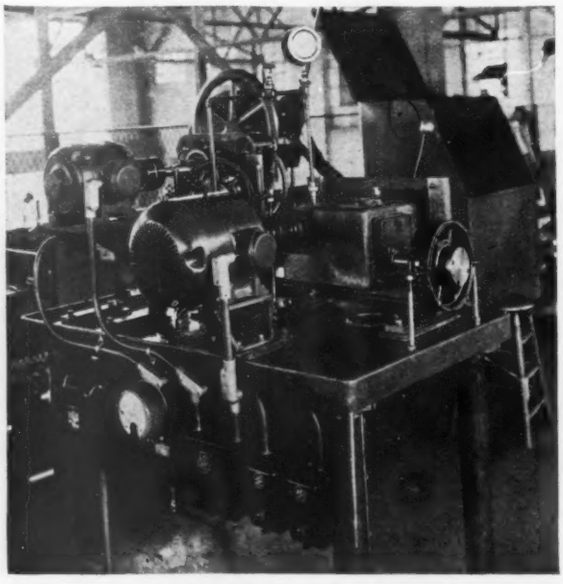
Light Hoods Do Special Lighting Job

To obtain the shadow-free illumination essential to accurate layout of drill holes inside deep boxes the G&W Electric Specialty Company, Chicago, was forced to depart considerably from customary practice in the application of light hoods to its layout table.

After some experimentation it was found that the best result, with 100 ft.-candles of shadow-free indirect light, was obtained with two 7½-ft. sections of light hood each with four 200-watt lamps, mounted at an angle 8 ft. apart and 6 ft. above the outside edges of the layout table.

Although it is customary to install light hoods directly above the working plane, it was found in this case that heavy shadows were cast inside the deep switch boxes by the workman's head as he leaned over to make prick punch or scribed marks inside.

With one light head installed on an angle, conditions were considerably improved, but shadows were not entirely eliminated until the second hood was installed.



Ammeter marks proper loading of tool-driving mechanism

Electric Devices Aid Machine Tool Tests

In testing the mechanism of tools manufactured by the Blanchard Machine Company, Cambridge, Mass., actual power-driving conditions are simulated by a special motor-equipped table provided with friction brakes and an ammeter by means of which the drives can be run at a predetermined loading and held in that condition until the absence of heating shows that the mechanism can be passed in production to assembly within the machine tool itself.

Three motors are installed at the table, rated respectively at 2, ½ and 1 hp. These are set up to drive a speed box, feed box and a traverse mechanism. The motors are of the 550-volt, three-phase induction type. In operation a Westinghouse 5-amp. ammeter of the plug-in type is used to mark full load setting by hand adjustment at the friction brake, and this reading is held constant throughout the test.

In this way noisy gears, poor bearings or misalignment are quickly located. The table is 30 in. high above the floor, 48 in. long and 30 in. wide. Formerly a less flexible belt-driven test table was used, and the steadiness of the test loading was much improved by utilizing individual motor drives. The motor brackets by which attachment to the table is made are of welded steel sections.

Announcing

FORMEX

A NEW Magnet Wire Developed by General Electric

FORMEX identifies a new G-E magnet wire insulated with a synthetic resin of the vinyl acetal type.

The result of ten years' research, far different in many properties from any other magnet wire, Formex wire offers new possibilities for making far-reaching, profitable improvements.

Physically, Formex wire is outstanding. It retains the high dielectric strength of conventional enameled wire and has, in addition, the strong physical properties of such fibrous coverings as cotton, silk, and paper. It thus allows more copper to be put into less space.

A Long-time Problem

Most users of magnet wire will appreciate what the problem involved: They know that enameled wire is satisfactory electrically for most applications *if* it can be wound into coils without damage to the film. But often it cannot be. The hazards in winding make necessary a fibrous covering—which serves chiefly as mechanical protection—over the enamel. Such a covering takes up space and has other shortcomings. How to get rid of it?

Ten-year Research Program

As a large user of magnet wire, General Electric had long been trying to solve this problem.

Nearly ten years ago, a broad, carefully planned program was mapped out and work was begun. It passed through many phases, each of which followed a definite pattern and contributed its essential part to the continuous progress of the whole.

The earliest indications of success were the first wires coated with certain synthetic resins of the vinyl acetal type. Next came an economical method of manufacture. Efforts, in the several years that followed, were directed toward making further detailed improvements and reducing costs. Today, success is at hand.

In all this work, contributions were made by our research, engineering, and factory laboratories, by engineering and kindred departments. Formex wire stands as a noteworthy example of co-operative research and development work.

Result: New Properties

The advantages of Formex wire can be told quickly: The physical toughness and abrasion resistance to stand the most severe tests . . . a flexibility never before thought possible in an enamel-like wire . . . resistance to most oils, to many solvents, to refrigerants, and to similar harmful agents . . . and the ability to withstand heat, aging, and shock.

Warrants Study to Find Most Profitable Uses

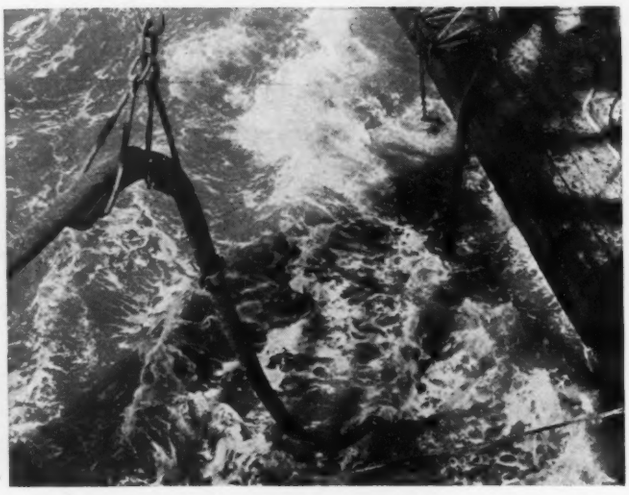
But the ultimate benefits from the use of Formex wire will have to be calculated. What economies will it make possible in high-speed winding? How much space—and cost—will be saved by the omission of cotton, silk, or paper? What of the savings in impregnation treatments? What will be the effects of fewer factory rejections and of overall improvements in quality of product?

Only study will reveal the answers. Naturally, all the applications of Formex wire have not yet been uncovered. In general, it can be used profitably to replace such bulky types as cotton-, silk-, or paper-covered enameled wire. But its field of usefulness has not yet been completely delineated.

For these reasons, we should like to have our magnet-wire specialists work closely with manufacturers' engineers in order that all the outstanding properties of Formex wire may be fully realized. More detailed preliminary information will gladly be furnished. Address the nearest G-E sales office or General Electric, Dept. 6—201, Schenectady, N. Y.

GENERAL ELECTRIC

Extra large sheave, made from halved pipe, is of light weight and allows free movement of cable



Extra large sheave, made from halved pipe, is of light weight suspended from dredge rigging

Design Cable Holders for Floating Dredge

To carry power to the 5,500-hp. electric dredge *S. G. Hindes*, being used on the fill for the new U. S. Naval Air Base at Alameda on San Francisco Bay, a cable barge, which is lashed behind the dredge during dredging, is employed effectively. The barge carries a cable reel accommodating 2,000 ft. of 11,000-volt, 250,000-circ.mil armored cable which extends to a substation on the shore. The reel end of this cable terminates on three slip-rings at the end of the reel shaft. Thus connection remains undisturbed as cable is reeled in or out. From the rings a second cable takes power to the dredge.

For the support of the shore cable where it leaves the barge a special light-weight sheave is employed. This was made by bending a 6-in. pipe into a 4-ft.-diameter circle, cutting along the pipe axis with a torch and removing the outside half. Circular steel plates, ½ in. thick, were then welded to the half-pipe. The sheave axle is a 3-in. pin, carried by ½-in. plates.

Between barge and dredge the cable is supported from the dredge rigging by means of a curved shoe. This allows height of the support to be varied and affords the freedom necessary to allow for swinging of the dredge.

The three transformers are in a concrete vault in the after section of the dredge hull, where they were needed as ballast for the 30-ton, 2,500-hp. main pumping motor, pump and cutter head, all of which are at the forward end. Vault vents are equipped with shutters which close automatically when fire occurs. CO_2 fire protection is provided as well.

All of these features were designed by engineers of the Pacific Bridge Company, owner of the dredge and contractor for the air-base dredging job.

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Improved Lighting at Transformer Foundry

A machine shop on the site of a former foundry at the plant of the Coppus Engineering Corporation, Worcester, Mass., presented an opportunity for greatly improved lighting in order to facilitate production.

A medium-height bay room was converted to its present use by hanging a ceiling on the under side of the roof trusses for better heat and light distribution, a floor being laid on the former area and machinery moved into the new department from other sections of the plant. The working area of the machine shop is 8,860 sq.ft. and general lighting is provided by 32 400-watt mercury-vapor units mounted in glassteel reflectors with auxiliary reactors concealed above the suspended ceiling.

Units are spaced on 16-ft. centers, with 12-ft. mounting heights, giving 25 ft.-candles intensity at the machines. The installation is wired for two units per circuit with control from a central distributing panel. Ninety per cent of the work is sufficiently illuminated by these general units, but for internal boring operations portable incandescents are used to supplement the above. The engineering layout was made by E. F. Duffy of the Coghlin Electric Company, Worcester contracting house.

25 ft.-candles suffice for general machine work, supplemented by portable units for special internal boring operations

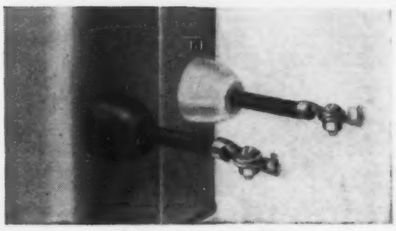
Now Same Size–Same Price

But

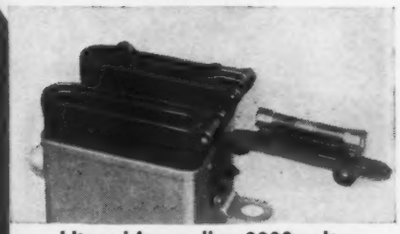
Better Accuracy • Higher Insulation

with these **NEW G-E Indoor Potential Transformers**

Types JE-1 and JE-2
Superseding Types JE-31 and JE-32
2300 VOLTS AND BELOW
60 Cycles



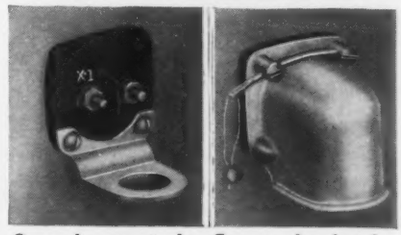
Primary terminals



Hinged fuse puller, 2300 volts

Mounting supports

Hinged fuse puller, 230 to 575 volts



Secondary terminals Cover and sealing bar

ACCURACY: These new Types JE-1 and JE-2 transformers maintain accuracy well within the highest NEMA classifications—½W, ½X, and ½Y. Furthermore, their characteristics have been so improved that from no load to full load the ratio curve has a slope of less than one per cent—the phase-angle curve, a slope of only 32 minutes!

INSULATION: You get a 2300-volt transformer that meets the 1.6-inch impulse test-gap requirements of the A.S.A. This results from better insulation than that of superseded types—provided without any increase in the size of the transformer. Lower voltage ratings meet the 0.8-inch impulse test-gap requirements.

NO INCREASE IN PRICE: You get all the advantages of the new Types JE-1 and JE-2 at no extra cost. Call the nearest G-E office for further information, or write General Electric, Schenectady, N. Y., for Publication GEA-3184.

HEADQUARTERS FOR ELECTRICAL MEASUREMENT

GENERAL ELECTRIC

420-53

NEW ENGINEERING IDEAS

Service Pipes Driven Entirely from Cellars

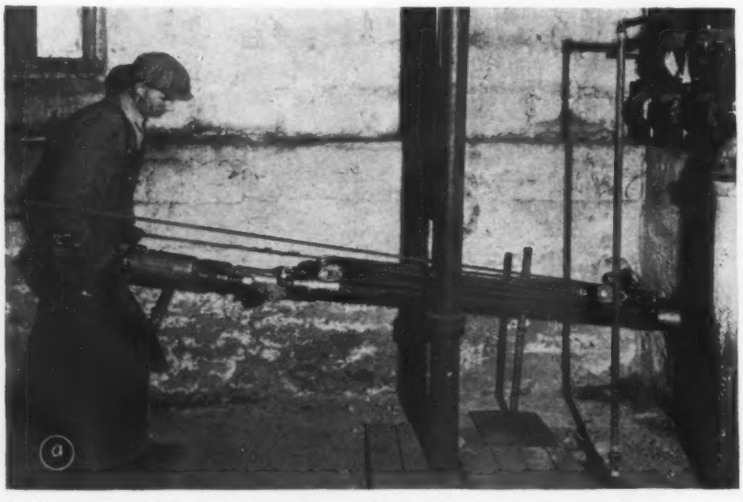
By J. F. FAIRMAN
Electrical Engineer
Consolidated Edison Company of New York, Inc.

The underground distribution system of the Brooklyn Edison Company, Inc., Brooklyn, N. Y., is frequently built in streets in advance of the actual need for underground service in those streets. When this is done, connections are installed in the street service ducts in front of each house or possible house location for future underground service installation. At the time the service is required, iron pipe is installed from the consumer's premises to the location at the curb where the branch or "Y" connection was left.

The most economical method for the installation of this pipe has been to drive 2-in. iron pipe from the consumer's cellar out to the "Y" connection at the curb. This is done by compressed air guns. To facilitate the use of air guns for this work employees have suggested several improvements in the methods used. The accompanying illustrations show the general set-up of the pipe-driving equipment and the dimensional details of design.

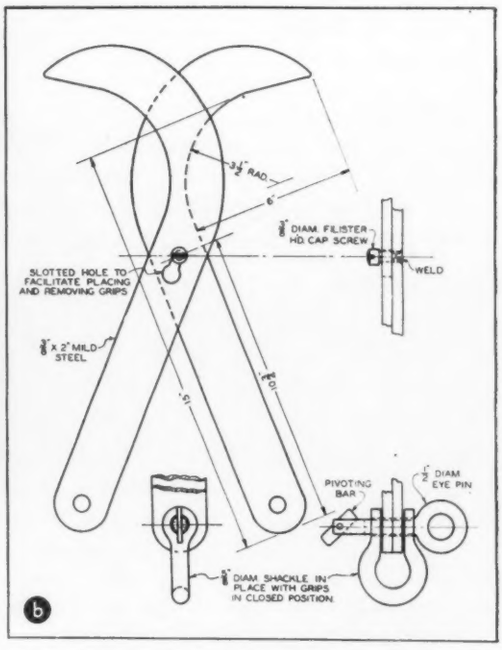
A self-supporting stand, devised by a Brooklyn Edison employee, is used to hold the pipe in place and takes the place of an old stand which required a person to hold it to keep it from falling.

The necessary tension to hold the air gun in position and to get the full benefit of the power from the gun is provided by block and tackle secured to the air gun at one end and to the building foundation wall at the other end by a special grip developed by another employee. Use of this grip eliminates the former method of digging outside of the foundation wall and placing an iron bar across the opening in the cellar wall as a means of securing the block and tackle. This was a makeshift way



Wall grip provides anchor for pipe pushing with compressor gun

(a) Stand supports pipe being pushed. The stand consists of a 12 x 12 x 1/4-in. boiler plate footing to which is welded a 30-in. piece of 1 1/2-in. pipe having a number of equally spaced holes drilled through it. A collar with a loop for holding the service pipe can be moved to the proper height and held in place by a cotter pin. This is intended for distances up to 30 in. above the floor. For holding the service pipe higher than 30 in. a 28-in. piece of similarly drilled 1-in. pipe with a V-saddle 3.1 in. deep at the top is slipped into the 1 1/2-in. pipe and held at the desired height by a 3/8-in. eye-pin.



Tong grip averts digging outside foundation wall to provide anchor for compressor gun

(b) Working in the reverse manner from a pair of ice tongs, this grip, with the handle end open, can be inserted through the hole in the cellar wall where the service pipe is to be installed. In the installing position the points of the tongs come together, but when they have been inserted through the cellar wall and the handle is closed the spread of the tongs is greater than the opening, thus gripping against the foundation wall and causing the points to secure themselves in the dirt. One end of the block and tackle is secured through holes at the closed end of the tongs.

Investment of $1,440

Yields $2,266 *Annually*

THE PROFITABLE EXPERIENCE OF A SOUTHWESTERN UTILITY WITH DISTRIBUTION CAPACITORS

AN annual return of 50 per cent *more* than the cost of installation—that was the result of the Albuquerque Gas & Electric Company's decision to solve a problem in undervoltage by the application of distribution capacitors.

WHY CAPACITORS WERE SELECTED

Voltage conditions, recorded on a 2400-volt feeder about 1½ miles from the substation, showed a drop of 7.6 per cent below normal. Since the line power-factor was only 89 per cent, it was obvious that a large percentage of this voltage drop could be attributed to the reactive amperes causing the low power-factor. So it was decided that the installation of capacitors to improve the power-factor was the logical way to solve the voltage problem.

WHAT THE CAPACITORS DID

After the installation of a pole-type Pyranol capacitor equipment, the peak-load power-factor was raised from 89 to 96 per cent. As a result of the power-factor increase, the voltage drop on the feeder was reduced to 3.4 per cent—an improvement of *more than 50 per cent.*

HOW THE CAPACITORS SAVED

Direct Savings

In revenue	$1,740	annually
In copper losses	526	"
Total	$2,266	

Other Savings

Increased feeder capacity (210 kva @ $25)	$ 657*	annually
Increased substation capacity (78.4 kva @ $15)	147*	"
Increased generator capacity (68 kva @ $120)	1,020*	"
Total	$1,824	

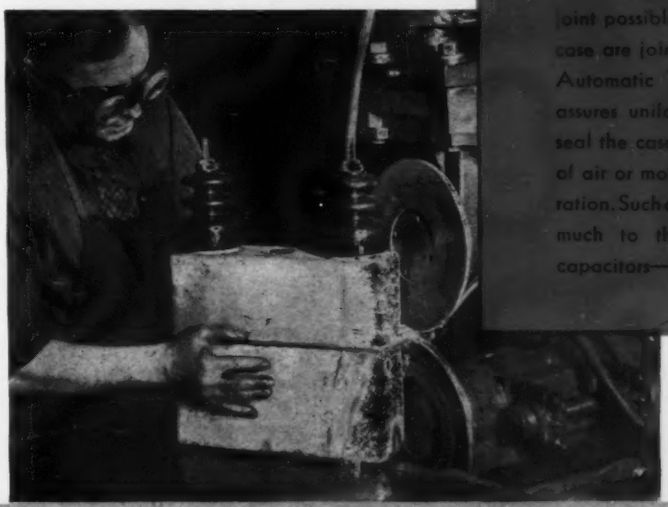
*Amount represents carrying charges at 12½ per cent of investment required to install this additional capacity.

CAN YOU SAVE?

On most systems today there are opportunities for applying Pyranol capacitors to release capacity on overloaded feeders or substations. The installation of capacitors usually means, too, an improvement in voltage conditions and a reduction in line losses. Consult your G-E representative about the application of Pyranol capacitors to your lines. And ask him for a copy of Bulletin GEA-2746, "Pyranol Capacitors for Central Station Application"; or write General Electric Company, Schenectady, New York.

HOW RELIABILITY IS BUILT INTO PYRANOL CAPACITORS

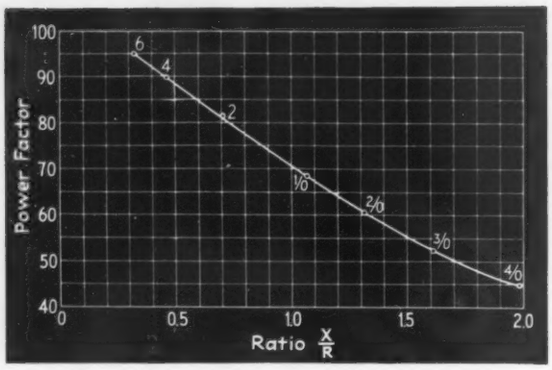
In order to obtain the strongest and tightest joint possible, the two halves of the capacitor case are joined with a single continuous weld. Automatic Thyratron control of this process assures uniformly good welds. This helps to seal the case effectively against the admission of air or moisture which would cause deterioration. Such care in manufacture has contributed much to the operating record of Pyranol capacitors—which is more than 99.8 per cent.



The G-E ten-million-volt lightning demonstration at the New York World's Fair uses 102 Pyranol capacitors, each rated 100,000 volts

GENERAL ELECTRIC

360-144



Curve shows the poorest power factor for any ratio of reactance to resistance

that was unsatisfactory because the bar frequently slipped out of place whenever the tension on the block and tackle was eased.

A pull loop of $\frac{1}{4}$ x $1\frac{1}{2}$ x 8-in. steel, welded to the air gun, furnishes a means of fastening the block and tackle to the gun. This was also the suggestion of an employee, to take the place of the previous method of hitching a chain around the gun and fastening the block and tackle to the chain.

The improvements in the pipe-driving methods described show the effect of employee cooperation.

•

Curve Aids in Proper Capacitor Application

By B. E. ELLSWORTH
Electrical Engineer
Iowa-Nebraska Light & Power Company
Lincoln, Neb.

Many articles have been published listing the benefits to be derived from the installation of capacitors. These benefits include improved regulation reduction of ampere loads and thus a reduction of losses. The application, however, must be properly made or the losses will be increased and regulation improved but very little.

The accompanying curve can be used to illustrate the application of capacitors and for other information relative to regulation. For any given line or combination of lines and transformers there is a certain power factor at which the voltage regulation will be the highest. At any other power factor, higher or lower, the regulation will be less for the same kva. or amperes delivered. The curve shows the worst power factor for any ratio of reactance to resistance. For 18 inches equivalent spacing and hard-drawn copper the wire sizes are given.

The regulation of lines with small conductors is not appreciably affected by a high value of reactive power. For example, assume two feeders of the same length, one with No. 4/0 and the other with No. 6 copper. Each line is carrying 200 kw. load at 50 per cent power factor. A 90-kva. capacitor is added to the end of each line, which raises the power factor on each to 62 per cent.

The following values obtain:

	No. 4/0 Feeder	No. 6 Feeder
K.V.A.—Before adding capacitor	400 kva.	400 kva.
After adding capacitor	325 kva.	325 kva.
Line regulation—Before	8.8	24.
per cent—After	8.8	23.
Line loss during zero—Before	0	0
power load periods—After	0.79 kw.	6.32 kw.

It will be noted that the regulation of the No. 4/0 feeder is greatly improved by the addition of the capacitor, while that of the No. 6 feeder remained practically constant. The curve shows that 45 per cent power factor is the worst possible for No. 4/0 wire, and so the change from 50 per cent to 62 per cent power factor greatly improves conditions. This benefit may be looked upon as being in addition to the reduction in kva. on the feeder secured by the addition of the capacitor.

On the other hand, the curve shows that 95 per cent power factor is the worst for No. 6 wire, which is a long way removed from either 50 per cent or 62 per cent. Notwithstanding the reduction of kva. from 400 to 325, very little regulation improvement was secured.

•

Warning of Plugged Water Intake Screen

By C. E. MILLER
Engineer, Potomac Electric Power Company,
Washington, D. C.

An interesting use of photo-cells at the Buzzards Point generating station guards against stoppage of the circulating water due to plugged intake screens.

The arrangement provided for preventing this source of trouble is shown in the illustration. A float in the water on the discharge side of the revolving screens moves a photo-electric cell up and down with the tide. The water level on the inlet side moves a 110-volt lamp attached to another float exactly in the same way as long as the revolving screens are clear. However, if a school of fish or excessive débris should tend to plug the screen the water level on the downstream side would drop, cause the photo cell to move up, break its source of light and operate a relay. This relay sounds an alarm in the station to call the operator's attention to the trouble and at the same time starts the revolving screens and the screen wash pump. To guard against the revolving screen operating without wash water, the screen motor is locked out by a pressure switch until the wash pump has built up to normal pressure.

Present practice is to have the photo-electric cell operate when the water level on the discharge side drops 4 in. below the intake. This keeps the screens from operating oftener than necessary and from becoming so clogged as to cause a deficiency of circulating water supply or strain screen mechanism on starting.

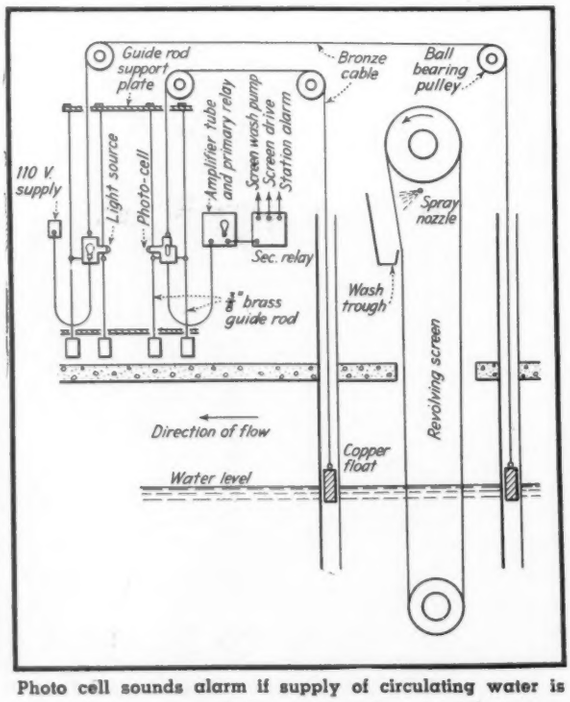


Photo cell sounds alarm if supply of circulating water is impeded by accummulation of obstacles at intake screen

HERE'S HOW YOU SAVE WITH G-E UNIT SUBSTATIONS

Accessibility of controls for inspection and adjustment is evident in this view of a single-circuit unit substation, installed in a substation of the Alabama Power Co., at Montgomery, Alabama

They're Easy to Install . . . .

because they're completely assembled at the factory

They're Inexpensive to Install . . . .

because they require no elaborate overhead structure

They Reduce Losses . . . .

because they can be installed near load centers—even in residential areas where conventional overhead structures would be objectionable

They Reduce Real Estate Expense . . . .

because their compact design decreases their space requirements.

EACH of these points mean savings for you—sometimes totaling as much as *twenty-five per cent!* Then, too, the unit substation is easily moved to a new location, a valuable advantage if load grows in an unanticipated direction.

When you're planning to serve a new area, be sure to get the complete story on unit substations from your G-E representative. General Electric, Schenectady, N. Y.

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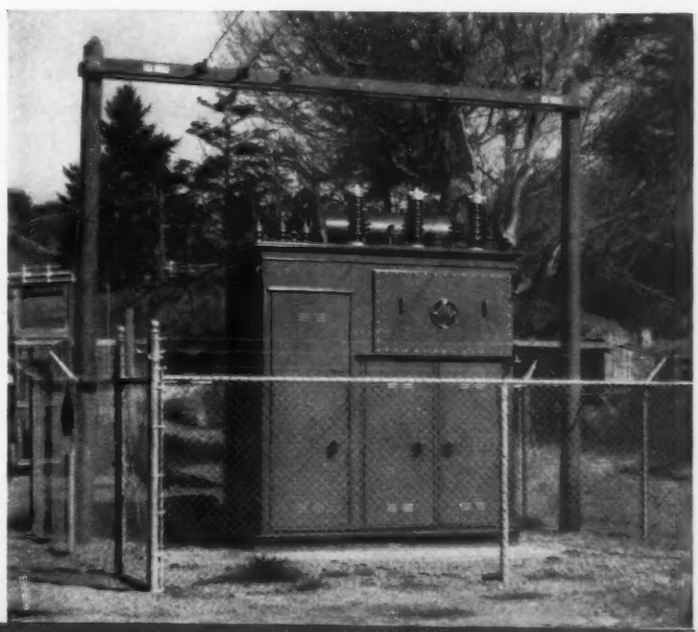


The simplified overhead structure and the compact substation unit provide an attractive installation for the Coast Counties Gas and Electric Company at Felton, Calif.

GENERAL ELECTRIC

LOAD BUILDING

Electric Heat Aids in Rust Proofing

By making a careful engineering estimate of ways in which electric heating could be of advantage to the Fentron Steel Company, Seattle, Wash., in carrying on its rust-proofing process, salesmen of Puget Sound Power & Light Company were able to benefit the customer with a 63-kw. installation despite the fact that other methods could show a lower fuel cost.

In a letter to the company, Herbert A. Schiessel, president of Fentron, wrote: "Our rust-proofing process has been in operation for more than two months, and the heating of the tanks has proven more successful than originally stated by you or anticipated by us, and our operating costs are well within the estimate you gave us."

The process requires five tanks, in which the following operations take place: (1) Cleaning in hot alkali, (2) rinsing, (3) bonderizing by coating with a non-conducting phosphate solution, (4) rinsing, (5) soaking in chromic acid solution to improve paint base. The product is then baked at 300 deg. F. for 60 minutes.

The tanks, all of which are covered and insulated with 5 in. of Rockwool, have the following capacities and heating units:

1	600-gal., two	10-kw. immersion heaters
2	400-gal., two	5-kw. immersion heaters
3	400-gal.,	8-kw. strip heaters
5	400-gal., two	4-kw. immersion heaters

The oven, similarly insulated, measures 6x10x8 ft. and has 20 kw. of strip heaters installed.

Thermostatic control is employed to maintain tank temperatures at 210 and 180 deg. F. and to hold the 300-deg. temperature in the oven.

Employed in connection with the production of Fentron steel window frames, the equipment showed a consumption of 4,300 kw.-hr. on the production of 2,500 units in a month. Installed cost of equipment was $1,200.

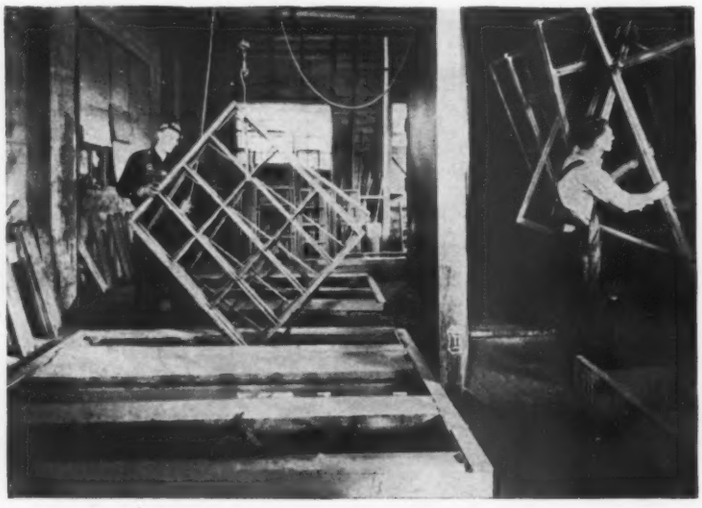
The benefits realized by the company include: Saving through the fact that hiring a heating-plant attendant is unnecessary, installed cost half that of next lowest fuel, close control of temperature, savings in space and savings in insurance cost.

•

"Conditioned Light" Up to 200 Ft.-Candles

Selection of merchandise by customers is made easier through use of "conditioned light" in the Neisner Brothers store in Springfield, Mass. The store created a special problem in proper illumination, because there were three distinct light requirements —main floor, mezzanine and basement.

Westinghouse Magnalux com-



Rust proofing process utilizes 63 kw. of heating

Left—The rust-proofing tanks with steel in process of being transferred. At right is the electrically heated bakeoven.
Right—Tanks extend below the operating floor and the electric installation lends itself to the small-space requirements. Feeders and terminal boxes can be seen in this view taken before completion, with insulation still exposed.

View of Boston, population 1,543,000

HERE'S a quick look at the way General Electric advertising is constantly at work in Boston, promoting light-conditioning for Better Light-Better Sight. Into Boston homes every week goes a steady stream of G-E lamp and lighting advertisements amounting to approximately *60* impressions per person in the last ten years.

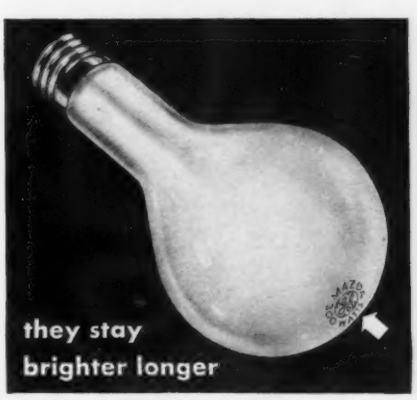
IN 1939 . . . 6,600,000 magazines with G-E lamp advertisements and 1,862,000 radio messages.

SINCE 1929 . . . 69,300,000 magazines with G-E lamp advertisements.

FALL 1938 . . . 4,749,000 copies of Boston newspapers with G-E lamp advertisements.

LAST 3 YEARS . . . 17,031,000 newspapers with G-E lamp advertisements.

SINCE 1929 . . . 93,782,000 advertisements in magazines, newspapers, and radio . . . which is approximately 60 advertisements per capita.



G-E MAZDA LAMPS
GENERAL ELECTRIC

AND FOR ANY CITY . . . your own for instance . . . you can easily estimate the approximate number of lamp and lighting advertisements General Electric is delivering to your customers by applying the following national averages:

Going into the average wired home in 1939

14 magazines with G-E lamp ads
5 newspapers with G-E lamp ads
5 radio messages
24 total advertising messages

. . .

In the last 10 years, the average wired home received

158 magazines with G-E lamp ads
30 newspapers with G-E lamp ads
20 radio messages
208 total advertising messages

No need to ask the customer "to step over into the light" to examine a piece of merchandise in this store

mercial lighting units, in some cases supplemented by intensifying fixtures, were used for the installation. The mezzanine floor, a beauty shop, is illuminated by 300-500-watt Magnalux luminaires which provide 30 ft.-candles of light. Lighting on the main floor is a combination of 750- and 1,000-watt units and intensifying units. Display areas have 200 ft.-candles of light. Arrangement of the luminaires is similar in the basement.

•

Commercial Cooking Serves 1,800 Daily

Three years of electric cooking have built a highly profitable restaurant business for the H. L. Green Company of Philadelphia. With a seating capacity of 95 customers and serving only late breakfasts and luncheons, the company today averages 1,800 customers a day throughout the year, and has served as many as 3,616 on peak days. The restaurant was established in 1936.

The owners of the business attribute its success to the fact that its electric kitchen turns out food that tastes exactly like electric home cooking. High quality food, economically priced, and cooked the modern way in its tested and approved all-electric kitchen, attracts customers and holds their trade.

"Just like home cooking, all our foods have a different, better-flavored taste and a more appetizing appearance," the management declares. "Preserving the goodness of our vegetables, cooked electrically with a minimum amount of water, has resulted in continuous calls for vegetable platters.

"So popular is our feature platter, fried oysters, that our chef prepares from 1,000 to 1,500 a day during oyster season. In the meantime, the demand grows for our 20-25-cent platters, including meat, two vegetables, biscuits and butter."

The kitchen of the Green Company restaurant is entirely electric. It is equipped with two large ranges, a three-deck cake oven, fryer and broiler. On the service counter are operated four four-slice toasters, a sandwich grill, waffle iron, egg boiler and ten glass coffee warmers. Careful checks of operating costs have shown this kitchen to be remarkably economical. The savings along this line, the company states, have definitely enabled it to serve a higher quality of food at low prices.

•

Sterilamp Stops Mold on Refrigerated Fruit

So successful was the initial, experimental installation of a Westinghouse Sterilamp that the McDonald Produce Company at Durango, Colo., has installed two more. Use to which the lamps are put at the McDonald plant is that of protecting perishable produce. The Sterilamps have effectively prevented mold growth on produce in refrigerated storage.

To determine performance of the initial lamp, twenty lug boxes of unsalable tomatoes, covered with mold, were placed in a 5x7x7½-ft. refrigerated room, in which the lamp was installed. It was found that irradiation stopped mold growth on the fruit directly irradiated and that even tomatoes shielded from exposure in the bottom of the boxes remained fresh, which presumably resulted from sterilization of the air.

Grapes, even in refrigerated storage, usually begin to show signs of mold within five days of the time stored. At the end of twelve days they usually have become unsalable. Stored with a continuously operating Sterilamp, grapes at the McDonald plant were in perfect condition at the end of five weeks.

Bananas were the only fruit on which the lamp had any undesirable effect and they underwent a darkening of the skin, although the fruit was not otherwise impaired.

Sterilamp installation in refrigerated storage room at Durango, Colo., was successful in preventing mold growth on perishable fruit

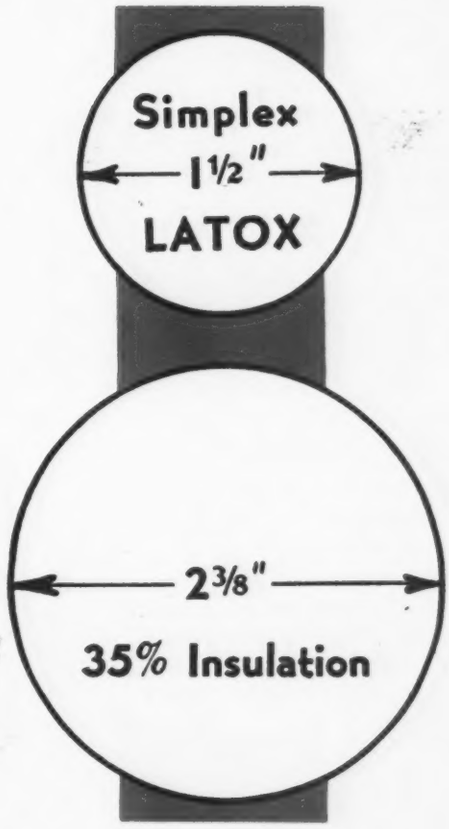
You Can— with Simplex-LATOX Cables

You can put more control circuits in an already crowded conduit. One way — we believe it is the best way — is to replace conventional cables with Simplex-LATOX cables. Many electrical engineers have solved their problem in this way during recent years of stringent economy when faced with the necessity for providing additional circuit facilities.

Simplex-LATOX, the new thin rubber insulation — made directly from rubber latex — enables us to put more conductors into a cable of given diameter without sacrifice of any electrical qualities or insulating properties.

Simplex-LATOX cables are from 30% to 50% smaller than cables insulated with conventional rubber insulation. Each circle above shows the exact size of a 127 conductor lead covered control cable. One is insulated with Simplex-LATOX, the thin insulation made directly from rubber latex, the other has conventional 35% rubber insulation.

A copy of the book "Simplex-LATOX Lead Covered Cables" will be sent upon request.



Simplex Wire & Cable Co., 79 Sidney St., Cambridge, Mass.

Simplex – LATOX

Thin insulation made directly from rubber latex

NEW EQUIPMENT

Radio Telephone

Electric utility requirements in two-way communication prompted the development of this two-way telephone which features an output of 15 watts—said to be three times as much as previously available—with almost no increased demand on the car's storage battery. New type of vacuum-tube relay used in the "codan" circuit is said to make the receiver more sensitive to the voice and to the voice only. Carrier waves from the distant station actuate this device, which, in the absence of a signal, shuts off the output of the receiver. Transmitter and receiver are built in the form of two compact, interchangeable units which quickly slide into slotted mounting plates attached to the floor. Tuning adjustments may be made with an ordinary screwdriver. A telephone handset is used.

Type "228-A" radio telephone equipment, unit covers removed from transmitter and receiver; frequency range, 30 to 40 megacycles; sensitivity, 2 microvolts or better over entire band; selectivity, 6 db. down, band width of 50 kc., 60 db. down, band width, 180 kc. **Western Electric Co.**, New York, N. Y.

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Dehumidifier

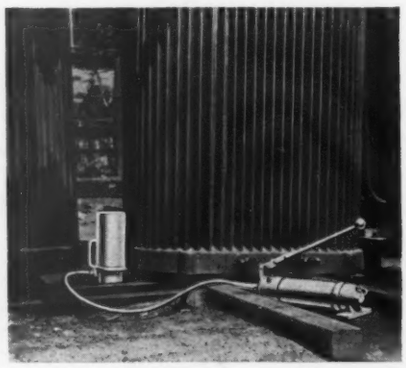
"Aqua-Sorber;" Model "HB-100" contains 100 lb. of "Aqua-Sorb," has humidistat and Delco twin blower, fractional-hp. motor; Model "Jr-B-40" contains 40 lb., uses Wahl fractional-hp. motor blower unit; Model "Jr-40," non-mechanical model. **Aqua-Sorb Co.**, 21 South 16th St., East Orange, N. J.

Dehumidifying units are announced for those commercial and industrial applications where dampness and high humidity are operating problems. Larger unit is equipped with a centrifugal exhaust blower mounted in the upper part of the metal cabinet, automatically controlled by a humidistat which can be set to the relative humidity desired. Air is drawn through a grilled opening in the bottom of the unit, first passing through the moisture-absorbent material ("Aqua-Sorb"), which dissolves, forming a brine. This brine trickles down through the filter bed and finally runs off through the bottom opening. Unit will remove dirt, dust and pollen from the air, according to the manufacturer, and will remove up to 75 per cent of the humidity from the air treated.

•

All-Directional Jack

Used as a toe-lift jack, this hydraulic jack will lift a power transformer or other electrical equipment weighing up to 25 tons from 2¼ in. off the ground to a height of 8¼ in. The remote-control feature of the jack makes operation in cramped quarters possible; pump is separated from the ram by a high-pressure hose. This separation feature also permits the jack to work in all directions, pushing as well as lifting. Selector valve on the pump regulates pumping speed of ram for 15-, 25- or 50-ton loads.



Model "S-80 Porto-Power" 50-ton jack; pump weighs 22 lb., ram 60 lb.; ram has low height of 11 in., 6-in. hydraulic lift. **Blackhawk Mfg. Co.**, Milwaukee, Wis.

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Insulating Tape

"Speed Splice" tape; standard rolls of 50 ft., ¾ in. wide; special widths from ½ to 30 in. **Accurate Mfg. Co.**, 44 Hepworth Place, Garfield, N. J.

Electrical insulation as well as mechanical protection is said to be provided by this new tape, consisting of cotton sheeting impregnated with pure rubber compound. While it is not 100 per cent moisture-, chemical- or flame-resistant, it is said to be super-aging and protected against rotting and fungus growths. Single thickness of the tape is said to have a dielectric strength of between 9,000 and 10,000 volts. Pliability and thinness of tape makes for a neat joint.

Series Lighting Switch

"Serieswitch;" rated 7½ amp., 5 kv., for use on series circuits using 5 to 30 kw. constant current transformers; "Gap-Links," with voltage breakdown ratings from 750 through 5,300 volts. **W. N. Matthews Corp.**, St. Louis, Mo.

Name of these series lighting switches has been changed from "Filmofuse" (announced in ELECTRICAL WORLD, July 3, 1937, page 132) to "Serieswitch," since one-piece "Gap-Links" replace the previously used combination of film cutout and 3-amp. fuse link. New "Gap-Links" consist of three-amp. fuse link to which is permanently attached a calibrated gap which will break down when an "open" occurs on the protected street series lighting loop circuit and builds up the voltage beyond the gap resistance. When this occurs, the 6.6-amp. current follows across the gap and melts the 3-amp. fuse, disconnecting the loop circuit and bridging the main circuit across the upper contacts of the switch.

•

Flexible Guy Guard

In contrast with the conventional rigid metal shield, this guy guard consists of a series of bead-like spindles of seasoned hardwood strung together on the guy to the required height. To give added visibility, the spindles are finished with aluminum paint. They are easily installed, an ordinary hammer being used to drive two nails into the drilled holes; cable clamp locks the spindles at the top of the guy.

"Flexibal" guy guard; standard set, providing 7-ft. guy, consists of 14 spindles and cable clamp. **S. E. Overton Co.**, South Haven, Mich.

"AS THE PROOF OF THE PUDDING IS IN THE EATING"

—SO THE BEST CLEVIS

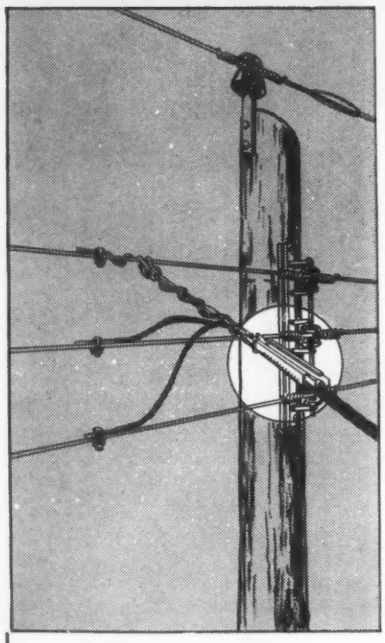
IS ONLY AS GOOD AS THE SERVICE IT GIVES. HUBBARD CLEVISES ARE DESIGNED TO PROVIDE HIGH MECHANICAL STRENGTH AND GREAT RESISTANCE TO FLASHOVER. FURNISHED IN ALL SIZES AND STYLES.

HUBBARD AND COMPANY

PITTSBURGH . . . OAKLAND CALIFORNIA . . . CHICAGO

"HANG THE LOAD ON HUBBARD HARDWARE"

Modernize
YOUR DISTRIBUTION PRACTICE—



Residential area construction — showing single phase primary with attachment of service cable a couple of feet from pole to high strength common neutral wire.

RELIABLE CONCENTRIC CABLE CLAMPS

hold cable securely without bending or snubbing or otherwise damaging the insulation. Non-corrosive materials — easy to install — low in cost.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO ILLINOIS

Service-Entrance Cable

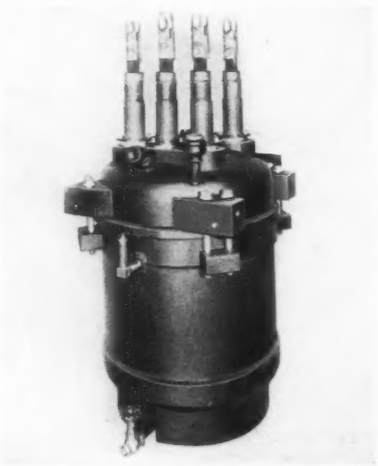
Type SE service-entrance cable, Styles "A" and "U." **General Electric** appliance and merchandise dept., Bridgeport, Conn.

Greater flexibility without loss in quantity or quality of impregnating material used on individual conductors is said to have been provided by a new construction on type SE service-entrance cables. Both styles may be bent edgewise easily for neat installations; cellophane is wrapped longitudinally over the "black" conductors of each cable to permit independent movement of conductors when severe edgewise bends are made. On each of the tinned copper conductors is a 30 per cent rubber insulation plus cotton braid saturated with weatherproofing asphalt. Over the two conductors goes a concentric uninsulated conductor, two overlapping wraps of rubber-filled tape with asphalt between, and outer braid, weatherproofed and finished neutral. Style "A" has a flat galvanized steel armor between the concentric conductor and the double wrap of tape.

•

Oil Circuit Breakers

New oil-tight breakers of the single, round tank type are equipped with an oil gauge, drain valve, exhaust pipe and emergency relief vent. Drain valve is connected to draw all oil and sludge from tank. Exhaust pipe has baffled connection to tank head with provision for trapped oil to drain back into breaker tank. High-strength, tube-type Bakelite bushings are used. Normally arranged for frame or cell mounting, breakers are adaptable to vertical lift or horizontal dragout arrangement.



"Turblator" oil circuit breakers; indoor types, manual or electrical operation, classes "150-TCR-2" and "250-TCR-2," 600 to 2,000 amp., 7.5 and 15 kv., 150,000 to 250,000 kva. interrupting ratings. **Roller-Smith Co.**, Bethlehem, Pa.

•

Hand Lamp

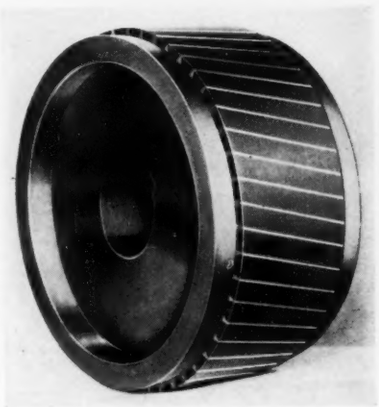
"Big Beam No. 1000;" uses 9-volt battery; main bulb operates over ten continuous hours, auxiliary bulb about 100 hours. **U-C Lite Mfg. Co.**, Chicago, Ill.

Projecting a ray over 2,500 feet, this portable hand lamp is similar to a previously announced model (ELECTRICAL WORLD, April 8, 1939) but is battery-powered rather than rechargeable. Finger-tip control is provided for both the main and the auxiliary bulbs. It may be used as a searchlight or as a floodlight when an interchangeable lens is added. Head can be focussed while the lamp is being carried and will stay in position. Battery to lamp contacts are made automatically; no wiring or de-wiring is necessary when changing the battery, according to the manufacturer.

•

One-Piece Copper Rotor

Centrifugal casting has enabled this company to develop a one-pice copper rotor, characterized by high electrical conductivity, low thermal expansion and high mechanical strength even under abnormal temperatures, this last property said to be of particular advantage in motors for plugging or reversing duty. Rotor bars and end rings are formed by pouring molten copper into a revolving mold containing the punched laminations, which are stacked and held under pressure. Copper is admitted at one end only, the opposite end ring being formed of the material that has passed through the rotor slots. Rotor winding is said to have a melting point of approximately 2,000 deg. F., as compared with 1,100 deg. F. for aluminum.

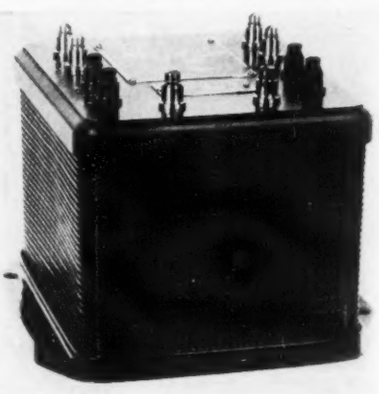


"Copperspun" rotor; available for open-type, splash-proof, fan-cooled and explosion-proof motors. **Fairbanks, Morse & Co.**, Chicago, Ill.

•

Thermal Converter

When connected in an a.c. metering circuit (secondaries of a conventional set of instrument transformers) this thermal converter performs a proportional change from a.c. watts to d.c. millivolts. With it, a power load may be directly expressed by a d.c. potential difference suited to transmission over considerable distance and for totaliza-



"Thermoverter." **The Bristol Co.**, Waterbury, Conn.

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There is only one economically sound basis of power plant protection. And that is, to have the right amount of it. **Too much** doesn't give you more than you need . . . but it costs you more. Too little can be disastrous and cost you **even more!**

"Ocean and Columbia" maintain a specially trained staff whose job it is to eliminate the guesswork in shaping your protection. Accurate analysis and long experience combine to suggest a program based on fact and need. Luxury trimmings are not considered because to "Ocean and Columbia" this is a partnership job.

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(In Rounds, Flats and Squares)
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That New, Tough, 60% Jacketed, Heavy Duty Portable Cable

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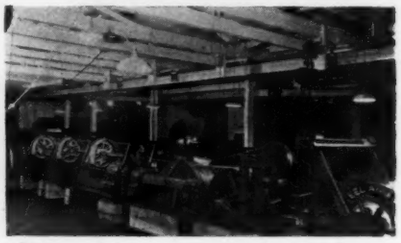
tion. Either a direct-deflecting millivoltmeter or a potentiometer may be used as the measuring instrument; time of response between a change of a.c. load and development of proportional e.m.f. in the converter is said to be less than ½ second.

•

Cable-Taping Machines

Built to apply three tapes in either direction on cable ranging in sizes from ⅜ to 3½ in. outside diameter, new concentric type taping machines embody features to prevent registration of tape. These features include self-adjustable angle, and adjustable point, of tape application, pre-adjustable and uniform tension of tape and an



Concentric type taping machine; theoretical output, 6.68 ft. per minute, minimum, 33.41 ft. per minute maximum; 66-in. pay-off and take-up reel stands; variable-speed transmission on capstan drive. **Thomson-Judd Wire Machinery Co.**, Lynn, Mass.

automatic electrical stop which provides for a quick stop of the machine when tape breaks or runs out. Double-capstan arrangement—one flat and driven, the other grooved and idle—guards against injury to cable and guides the cable from one side of the capstan to the other without rolling or twisting or being pushed on its sides by a knife. Adjustable tension device is used on the pay-off reel stand to maintain tension on cable as it travels through the machine.

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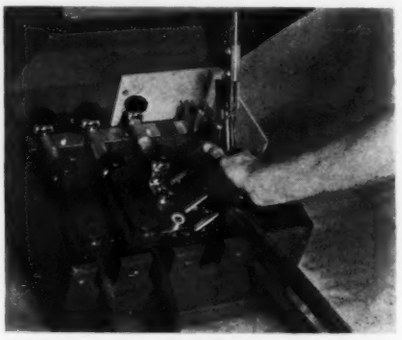
Cable Connector

An interlocking junction for making d.c. trailing cable connections with the power off is a recent development. Quick-break switch is interlocked with the steel case so that case cannot be opened and connections



Type "B" multiple cable junction box. **Ohio Brass Co.**, Mansfield, Ohio.

cannot be made with the power on. Fuse protection is provided for each of the three machine circuits—positive, negative and ground—which the gas-proof device accommodates. Cables are clamped in rubber hand grips, each of which has three phosphor bronze plugs so arranged as to prevent their insertion in the wrong circuit. One plug makes contact with positive line, one with negative and one with ground.

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This International 1½-ton Model D-35 Truck is used by the New York City Fire Department as a maintenance truck for its telegraph system.

INTERNATIONAL TRUCKS

NEWS ABOUT PEOPLE

Harrod Made President of Central States Power

C. L. Harrod, president of the Laclede Power & Light Co., St. Louis, Mo., was elected president of the Central States Power & Light Corp. at a recent meeting of the board of directors. He succeeds B. F. Pickard, who has

been elected to the presidency of the Interstate Power Co., Dubuque, Iowa. Mr. Harrod will continue as chief executive of the Laclede Power & Light Co.

Mr. Harrod's first position, following graduation from Purdue University, was with the Pennsylvania Railroad. He served in the engineering and operating departments, specializing first on signaling apparatus and later in a supervisory capacity in connection with construction, operation and maintenance of substations and transmission lines of the Philadelphia electrification of the railroad.

After military service in the World War he served as consulting electrical engineer of the Indiana Coal Operators Power Association. In 1927 he became general manager of the Indianapolis Chamber of Commerce, the position he held until his election to the presidency of the Indianapolis Power & Light Co. in 1930. He became president of Laclede Power & Light in 1938. Mr. Harrod is a past-president of the Indiana Engineering Society.

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Cutler-Hammer Appoints New Department Managers

Appointment of E. W. Seeger as manager of the development department and P. B. Harwood as manager of the engineering department of Cutler-Hammer, Inc., has been announced by G. S. Crane, vice-president in charge of sales and engineering.

Mr. Seeger was formerly in charge of the production engineering department and will now become responsible for the company's development activities. He has been closely associated with the development of new apparatus and holds a considerable number of patents on motor control apparatus. Mr. Seeger joined the company in 1913 and since that time has been engaged in various engineering activities of the company. He is a fellow of the American Institute of Electrical Engineers, a member of the Engineers Society of Milwaukee and for some time has been active on the codes and standards committee of

E. W. Seeger

P. B. Harwood

the National Electrical Manufacturers Association.

Mr. Harwood has been with the company for more than 20 years. After serving in the engineering department he was made assistant supervisor in charge of steel mill control, then general supervisor in charge of engineering and later assistant in charge of production engineering department. He is a member of the A.I.E.E. and the Engineers Society of Milwaukee. Author of numerous articles on electrical engineering subjects, Mr. Harwood recently completed a textbook dealing with the use of motor control for electric motors and is responsible for an impressive list of inventions in this field.

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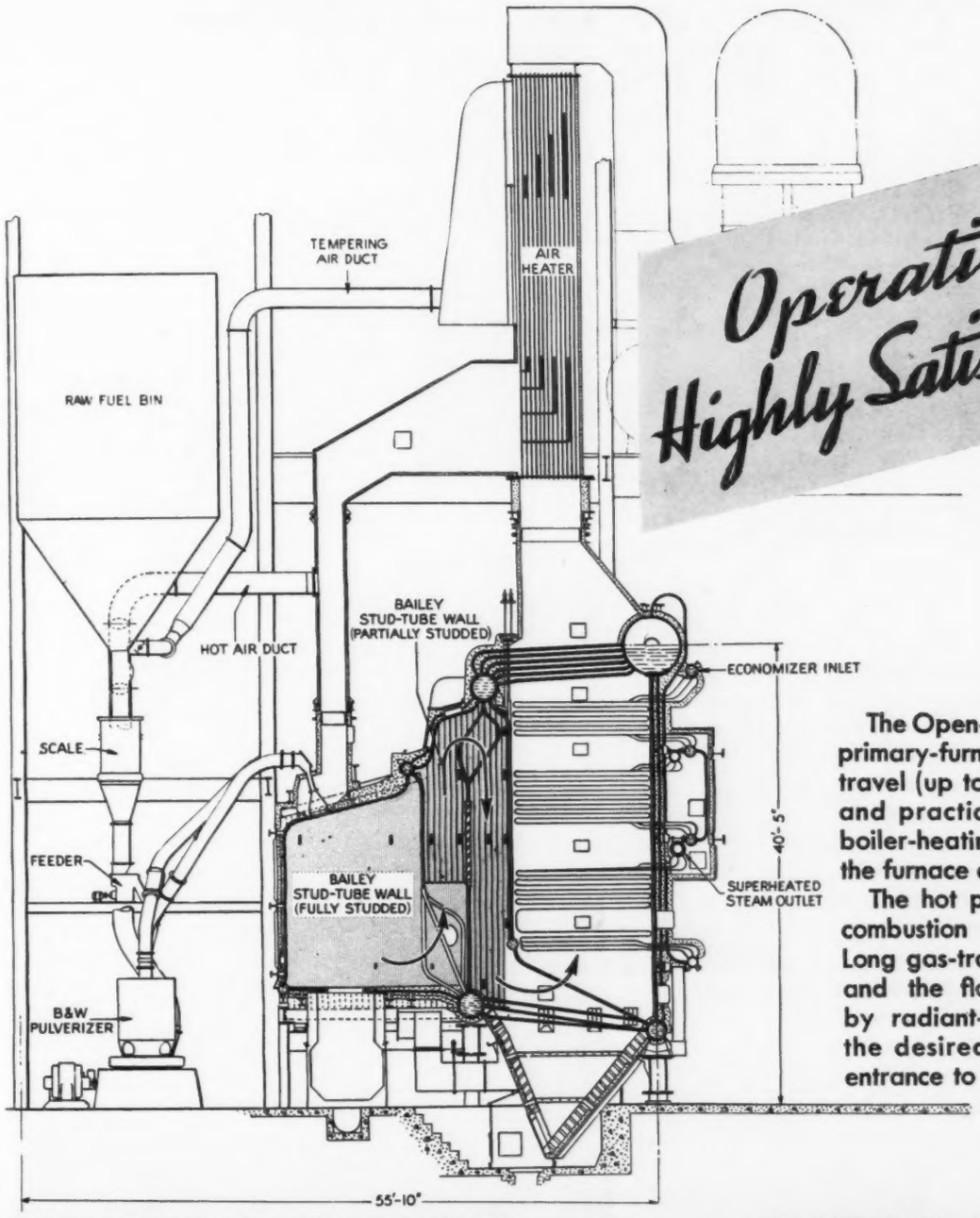
► DR. PAUL L. HOOVER of Rutgers University has been appointed professor of electrical engineering and head of that department at Case School of Applied Science, Cleveland, Ohio. Professor Hoover will assume active duties at Case on July 1, at which time PROF. HENRY B. DATES will retire from the chair of electrical engineering with the title of professor emeritus. Dr. Hoover is a member of the American Institute of Electrical Engineers and the American Association for the Advancement

2 B&W OPEN-PASS BOILERS

IN COLUMBIA STATION

Cincinnati Gas & Electric Co.



Operation Highly Satisfactory

The Open-Pass Boiler has a hot primary-furnace... and long gas-travel (up to 125 feet, or more) and practically no convection boiler-heating-surface between the furnace and the superheater.

The hot primary-furnace aids combustion and slag tapping. Long gas-travel cools the gases and the floating ash-particles, by radiant-heat absorption, to the desired temperatures for entrance to the superheater.

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of Science and is the author of a number of important professional papers. Several patents have been issued on the outcome of his researches. Professor Dates retires from active service after 34 years on the Case faculty. He will continue to serve for the present as director of the evening division. He is a past-president of the Illuminating Engineering Society and has been for a number of years a member of the International Commission on Illumination.

▶ ANGUS MCARTHUR has been elected a director of the United Light & Power Co., to succeed Howard Bruce, who resigned because of his banking affiliations, which were in conflict with the amended rule of the SEC which became effective April 1.

▶ CHARLES W. NICKERSON, who resigned as chief electrical engineer at the New York World's Fair, has been elected vice-president of Claude Neon Lights, Inc., in charge of operations. Mr. Nickerson was a utility engineer for 20 years and also served as chief electrical engineer for Warner Bros. theatres. In his capacity as chief electrical engineer for the World's Fair he designed and constructed the underground light and power system with respect to cable type of conduit and manhole construction.

▶ ROY MARTINDALE has been appointed electrical engineer in charge of operations for the Bureau of Power and Light of the city of Los Angeles, Calif. Mr. Martindale has been with the Los Angeles bureau since 1911, assuming in 1920 the position of assistant operating engineer, the position he held until his recent appointment. From 1908-1911 he was employed on power projects by the Washington Water Power Co., Spokane, Wash.

▶ DONALD M. SIMMONS, chief engineer of the General Cable Corp., was awarded the honorary degree of doctor of engineering by Princeton University on June 20, in recognition of his achievements in the electrical industry. A graduate of Princeton, Mr. Simmons has been in the electric cable field for more than 25 years, except for 2½ years in the army. He is widely known for his contributions to the field of the transmission and distribution of electricity, both underground and overhead. His early work contributed to the proof of the value of type H or shielded cables, his invention of the present universal form of multi-conductor oil-filled cable and his development of type HH cable, the hollow overhead line conductor as used for instance in the 287,000-volt lines from Boulder Dam to Los Angeles. Mr. Simmons is active in committee work of the American Institute of Electrical Engineers, of which he is a fellow.

Miller Brothers Organize New Construction Company

Gordon C. Miller, for the last three years president of the Miller Baxter Co., construction engineers, Indianapolis, has resigned, and with his brother, John B. Miller, has formed the Miller Construction Co., Indianapolis.

Gordon C. Miller was formerly planning engineer of the Indianapolis Power & Light Co. and for eighteen years was in charge of construction work for the Management & Engineering Corp. of Chicago. He will act as president of the new organization. John B. Miller, for many years general superintendent of Interstate Power Co. of Dubuque, Iowa, has resigned that position to become vice-president and general manager of the new company.

G. C. Miller

J. B. Miller

The new organization will specialize in the construction of overhead and underground power and telephone lines, substation structures, street lighting systems, police and fire alarm installations.

•

▶ PROF. ALEXANDER G. CHRISTIE of Johns Hopkins University, Baltimore, Md., and president of the American Society of Mechanical Engineers, was awarded the honorary degree of doctor of engineering on June 10 by Stevens Institute, Hoboken, N. J., in recognition of his creative work in steam power production and use.

▶ JOHNSTONE WRIGHT, chief engineer of the Central Electricity Board, London, England, has been elected president of the British Institution of Electrical Engineers for the 1939–40 period.

OBITUARY

Julian C. Smith

Julian C. Smith, president of the Shawinigan Water & Power Co., Montreal, and president of the Montreal Tramways Co. until two months ago, died at his home in that city on June 24, in his sixty-second year.

Mr. Smith had been an outstanding figure in engineering circles in Canada for a number of years, though an American by birth. Elmira, N. Y., was his native city and Cornell University his alma mater. Since 1903 he had been connected with the Shawinigan utility in the capacity of superintendent, general superintendent, general superintendent and chief engineer, and then as vice-president and general manager. In 1933 he was elected president of the company to succeed J. E. Aldred, who resigned to become chairman of the board of directors.

Mr. Smith was also president of Quebec Power Co. and served on the board of directors of Montreal Light, Heat & Power Consolidated, Montreal Tramways, Royal Bank of Canada, Montreal Trust Co. and the Dominion Engineering Works, Ltd.

He served as president of the Engineering Institute of Canada and was a member of the British Institution of Electrical Engineers and the American Institute of Electrical Engineers.

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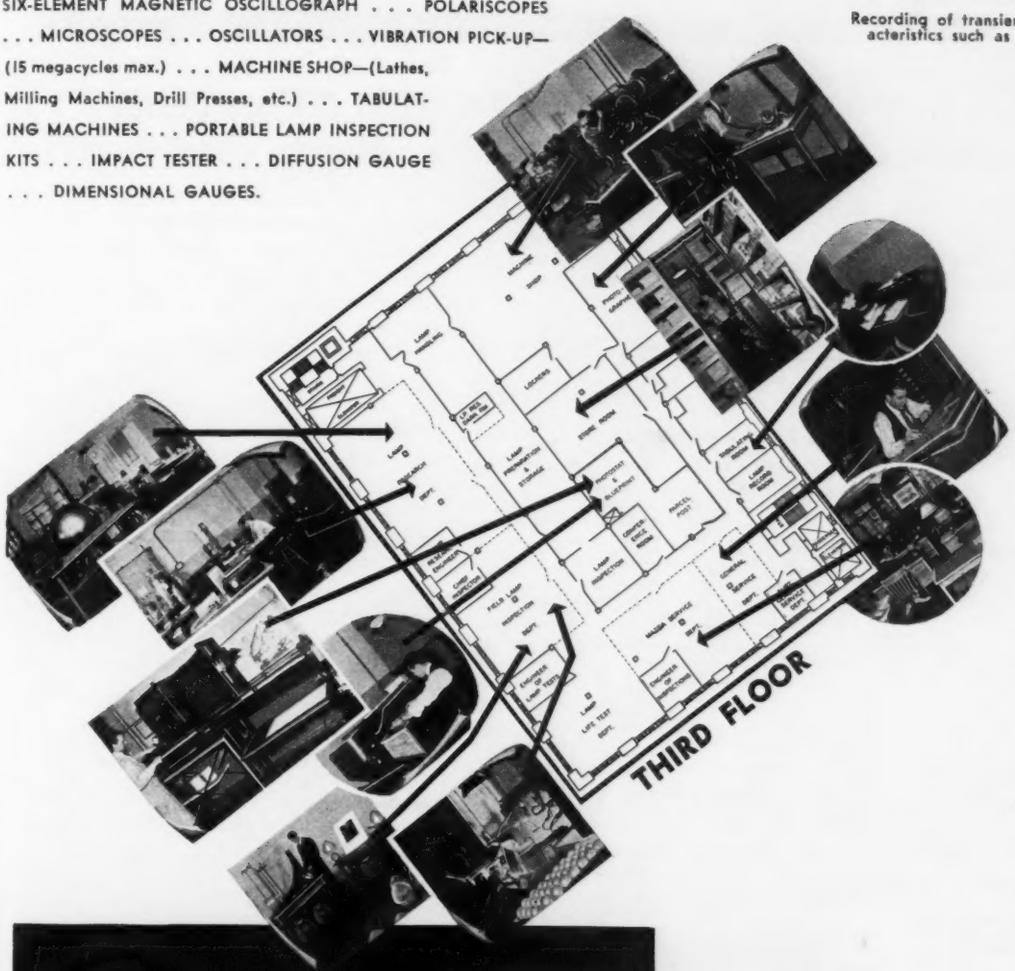
▶ ARTHUR W. KEMPTON, 65, former vice-president of Landers, Frary & Clark, New Britain, Conn., and later engaged in industrial engineering with the Keyes Weaver Corp., Buffalo, N. Y., died at the Springfield (Mass.) Hospital on June 12.

▶ WILLIAM S. FIELDS, senior power engineer, American Rolling Mill Co., Ashland, Ky., died March 9. From 1918 to 1924 Mr. Fields was employed in various capacities by the Union Gas & Electric Co., Cincinnati, Ohio. In 1924 he became supervisor of tests and power distribution for the American Rolling Mill Co., later becoming technician in the electrical power department, and senior power engineer, the position which he held at the time of his death.

MEANS TO AN END

STROBOSCOPE . . . CATHODE RAY OSCILLOGRAPH . . . GAS ANALYSIS EQUIPMENT . . . VACUUM TUBE AMPLIFIERS . . . SIX-ELEMENT MAGNETIC OSCILLOGRAPH . . . POLARISCOPES . . . MICROSCOPES . . . OSCILLATORS . . . VIBRATION PICK-UP—(15 megacycles max.) . . . MACHINE SHOP—(Lathes, Milling Machines, Drill Presses, etc.) . . . TABULATING MACHINES . . . PORTABLE LAMP INSPECTION KITS . . . IMPACT TESTER . . . DIFFUSION GAUGE . . . DIMENSIONAL GAUGES.



Determination of speed of transverse or rotational movement.

Checking of camera shutter speeds.

Recording of transient phenomena: rapidly varying characteristics such as volts, current, light output. Analysis of flash characteristics of photoflash lamps.

Measurement of light output and electrical values of special illuminants such as photoflash lamps.

Determination of the components of a mixture of gases and the proportions of each.

Amplification of small A-C voltages in measurable quantities.

Amplification of very small D-C or transient currents, or currents of very short duration, to measurable quantities—as with photoelectric cell currents.

Detection and determination of severity of internal strains in glass, as in street lighting gloves and refractors.

Study of crystal structure of metals and impurities in them.

Study of incandescent lamp performance during life.

Examination of lamp filaments, initially and after various periods of burning.

Determination of frequency, amplitude and wave form of vibration.

Tests of globe protective devices.

Construction of apparatus and gauges needed in ETL test work.

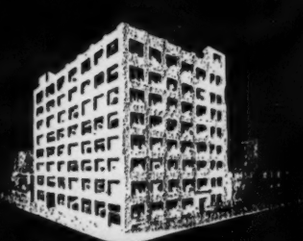
Rapid analysis of voluminous statistics.

Detailed physical inspections of lamps at any desired location.

Determination of physical strength of glass globes.

Tests of light diffusing qualities of globes.

Measurement of dimensions of street lighting globes.



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MANUFACTURING - MARKETS

TVA Lets Contracts for New Equipment

Thirty-one contracts have been awarded by the Tennessee Valley Authority, involving equipment, materials and services valued at more than $1,400,000.

Orders for equipment for the power distribution system at Gilbertsville Dam were placed with the following companies:

American Bridge Co., Pittsburgh, Pa., steel transmission towers, $375,444, and General Electric Co., substation transformer, $42,280, modernization parts for substation, $29,604.

The following companies have contracted to fill certain requirements at Chickamauga Dam and in the Chickamauga reservoir area:

General Electric Co., Schenectady, N. Y., transformers and reactors, $162,755; New York Blower Co., Chicago, Ill., power house heating, ventilating and air conditioning equipment, $6,612; Bishop & Babcock Manufacturing Co., Cleveland, Ohio, heating, ventilating and air conditioning equipment, $1,438; Diehl Manufacturing Co., Elizabethport, N. J., heating, ventilating and air conditioning equipment accessories, $486.

Equipment to be installed at the Hiwassee Dam power plant was purchased from the following firms:

International Steel Co., Evansville, Ind., structural steel for power house superstructure, $14,964; Westinghouse Electric & Manufacturing Co., Knoxville, Tenn., auxiliary power and battery charger switchboards, $14,654; Goulds Pumps, Inc., Seneca Falls, N. Y., oil purifying units, $5,339; General Electric Supply Corp., Nashville, Tenn., auxiliary power and lighting boards, $3,950.

•

Hawaiian Electric Orders Turbo Unit and Boiler

The Hawaiian Electric Co., Ltd., has ordered a 15,000-kw., 0.8 power factor, 11,000-volt, 3,600-r.p.m. turbo-generator from Westinghouse Electric & Manufacturing Co. An order has also been placed for a 180,000-lb.-per-hour Babcock & Wilcox integral furnace boiler to be installed.

This is the second unit for the Waiau plant. Steam conditions are the same as on the present unit, 650 lb. gauge and 825 deg. F. total temperature, according to L. A. Hicks, general manager.

•

Manufacturers Make Sales Assignments

The following appointments have recently been made to the sales staffs of manufacturing companies.

American Engineering Co., Philadelphia, has announced the appointment of A. C. Cooper Sales Co., New York City, as sales representative for metropolitan New York, Long Island and northern New Jersey.

The R. W. Cramer Co., Inc., Centerbrook, Conn., U. S. exclusive representative for the Sauter line of astronomical dial clocks and electric time switches as well as manufacturer of a line of electric timers, running time meters and other electrical devices, has appointed the following representatives: H. C. Lemire, Minneapolis, Minn.; J. T. Couchman, Indianapolis, Ind.; R. H. Heim, Cincinnati, Ohio; H. F. Darby, Jr., Philadelphia, Pa.; W. P. Daily, W. P. Daily Co., Pittsburgh, Pa.; Carman Adams Co., Detroit, Mich.; and Stearns, Perry & Smith Co., Boston, Mass.

April Orders Under March—Above 1938

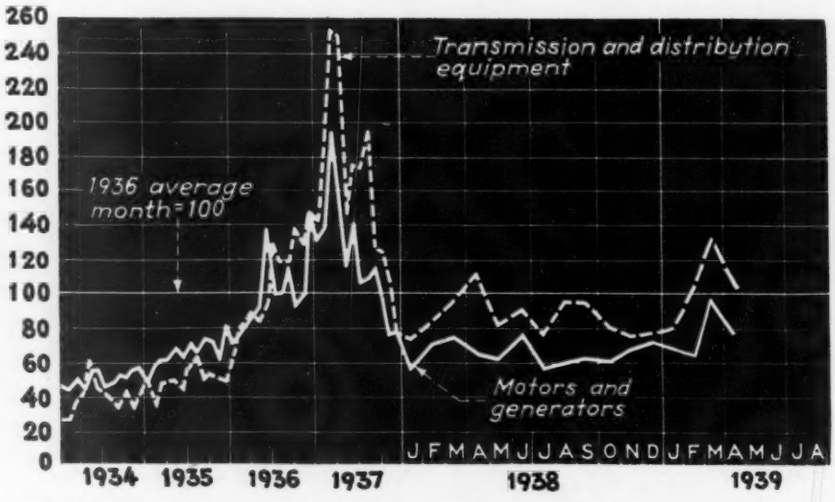
Orders for electrical goods in April fell off compared with March, after the strong rise in that month, but remained higher than in any other since the early part of 1938, according to NEMA index numbers.

For motors and generators the index dropped 21.8 points, equivalent to 22 per cent, to 77.5. For transmission and distribution equipment it declined 26.1 points, or 20.2 per cent, to 103.0.

Compared with the corresponding month a year ago the showing is more favorable. The first-named group gained 16 per cent, the other is off about 2 per cent, though it was slightly above the 1936 average which is taken as the base.

The five-year (1934 to 1938) average percentage changes from March to April were, respectively, —7.1 and +6.3.

	Motors and Generators		Transmission and Distribution	
Month	1938	1937	1938	1937
December	72.1	76.9	79.4	71.5
	1939	1938	1939	1938
January	69.2	57.4	81.0	70.2
February	67.8	70.8	108.3	79.3
March	99.3	74.7	129.1	91.4
April	77.5	66.6	103.0	105.4



N.E.M.A. Index of orders received for motors and generators and for transmission and distribution equipment

Carrier Air Unit Sales Advance 17½% in 1939

Sales of air conditioning and refrigeration equipment by the Carrier Corp. in March, April and May were 17½ per cent above sales in the similar months of 1938, according to J. I. Lyle, president. Orders in May, Mr. Lyle said, showed more than a seasonal advance.

"For the second time this year," he stated, "Carrier Corp. has noted the return of the 'big buyers' into the air conditioning and refrigeration market. Much of this company's increased business has come from large scale industrial installations." New markets for air conditioning are opening in the industrial field also, he added.

Election of Cloud Wampler of Stern, Wampler & Co., Chicago, to be chairman of the finance committee of Carrier was announced.

•

G.E. Buys Plant

Equipment and facilities of General Laminated Products, Inc., of New York have been purchased by General Electric Co. It is planned to equip the Meriden, Conn., plant for fabricating textolite products. For the past six years General Laminated Products has been the distributor and fabricator of General Electric's textolite laminated materials.

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Arrow-Hart Pays Dividend

Directors of the Arrow-Hart & Hegeman Electric Co. have declared a dividend of 40 cents a share on the capital stock. Previously the company paid 25 cents quarterly. The last payment was made on April 1.

•

Buys Diamond Machine Co.

American Engineering Co., Philadelphia, has announced that it has recently purchased the Diamond Machine Co., Providence, R. I., and will continue the manufacture of the Diamond face grinder in its Philadelphia plants.

New York Metal Prices

	June 27, 1939 Cents per Pound	June 21, 1939 Cents per Pound
Copper electrolytic	10.00*	10.00*
Lead Am. S. & R. price	4.85	4.85
Antimony	12.00	12.00
Nickel Ingot	35.00	35.00
Zinc Spots	4.89	4.89
Tin Straits	49.00	49.12
Aluminum, 99 per cent.	20.00	20.00

* Delivered Connecticut Valley.

Field Reports on Business

Although the summer lull is being felt in some areas, reports indicate that the volume of business being done is sufficient for industry to maintain an optimistic outlook. Inventories are being worked lower, but are gradually reaching the point when new stocks must be ordered.

NEW YORK

Industry leaders are of the opinion that the new tax measure and other steps anticipated by Congress will do much to stimulate production and to increase employment. The new spending-lending program advanced by Mr. Roosevelt is viewed as an election pork barrel.

Consolidated Edison is to push electric irons and roasters in its August appliance campaign. Refrigerators still command the attention of buyers, with sales holding up well. Other utilities in the area and dealers report good response to present campaigns. Appliance manufacturers view the trend of sales as holding promise for a banner year.

The National Association of Purchasing Agents reports business as spotty in some sections, but improved conditions sufficient to change the general commercial picture to a somewhat brighter hue. It was said inventories again show further reduction, which means that supplies are being worked down to the lowest level in keeping with current operating schedules.

Utilities coming into the capital markets are finding responsive investors. The volume in the past few weeks holds promise that other companies will soon be in the market for funds. Several large issues are planned for the future. It is anticipated that a curb on TVA operations and on government power projects will open the way for utilities, in the competitive areas, to refund outstanding security issues.

CHICAGO

Electrical business continued to show moderate expansion and moved toward the third quarter with considerable optimism over the outlook for the immediate future. Steady improvement in industrial activity has resulted in substantial increases in orders for electrical equipment. Appliance sales are holding well above last year's level with the larger household items showing increases over a year ago of 30 to 50 per cent.

Electrical power production remained fairly even last week at 13 per cent above a year ago. Electric range installations are substantially above last year's figures and contractors report a large increase in the number of additional outlets installed.

The Chicago White Sox will spend approximately $100,000 for electric equipment for night baseball. Work will begin at once on the installation of eight towers and more than 700 floodlights. It is expected the Chicago Cubs will install similar equipment this fall.

Residential building contracts awarded in the city and suburbs during May totaled $5,442,000, an increase of 253 per cent over May, 1938. Commercial and industrial construction amounted to $3,354,000, an increase of 69 per cent.

A large packing company will erect a new plant to cost $400,000. Construction will start at an early date on a large privately owned apartment project which will cost approximately $3,500,000.

NEW ENGLAND

United Electric Light Co., Springfield, Mass., has ordered seventeen additional 120-208-volt network submersible transformer banks with protector equipment aggregating 3,450 kva. from Westinghouse. Small motor buying is holding up well due to government and foreign machine orders. One motor manufacturer notes frequent repeat orders for motors ranging from 1 to 5 hp.; last week 22 motors were purchased by a Rhode Island machine manufacturer and a small group of 7½- and 10-hp. motors was purchased by a well-known chuck and grinder manufacturer.

Lighting sales are advancing; the J. J. Newbury chain has installed lighting effects and counter cooking appliances which will require approximately 40 kw. in one of its Massachusetts stores and interest in electric control apparatus for special applications is increasing.

Billings & Spencer Co., Hartford, Conn., has bought an electric finishing furnace having a capacity of 22 trays of wrenches at a single loading. Wiring supplies are in good demand and a moderate upswing in new construction presages further buying in good volume. Special wiring and sound projection apparatus are involved in a new memorial music shell, costing about $200,000, to be built in Boston, and alterations to the Houghton & Dutton building at a cost of about $150,000 will provide a large volume of new store-lighting fixtures.

Merchandising is reaching high levels in sales trends in Massachusetts and Vermont.

PACIFIC COAST

For the first time during 1939 a decrease from the preceding month will probably be recorded in electrical business during July. Wholesalers report a noticeable drop in business during the last week of June, and absence of their salesmen on vacation early in July will intensify the business lull. However, much business looms beyond this seasonal factor, particularly lighting and line material, and many big housing projects promise varied staple sales. San Francisco has seven scheduled, totaling $15,000,000, the first now being under way and the site of the last being unavailable until August, 1940. Lighting business is excellent because of school relighting on better standards, the number of large jobs in purchasing stage and an unusual number of ball park jobs.

Line contracts cover $209,694 for copper transmission circuits from Parker Dam to Phoenix and $13,755 for ground hardware and stringing two 230-kva. conductors and grounds at Columbia River crossing of Bonneville lines; $947,726 was the low bid for footings, erection and stringing conductors in steel towers of Bonneville transmission system. The city of Seattle is purchasing two carloads of copper wires for its own system. Recent machinery orders have included $59,784 circuit breakers from Pacific Electric Manufacturing Co., $171,720 for Westinghouse synchronous condensers for Oregon lines and $29,372 for wattmeters and street-lighting equipment for Imperial Valley irrigation district.

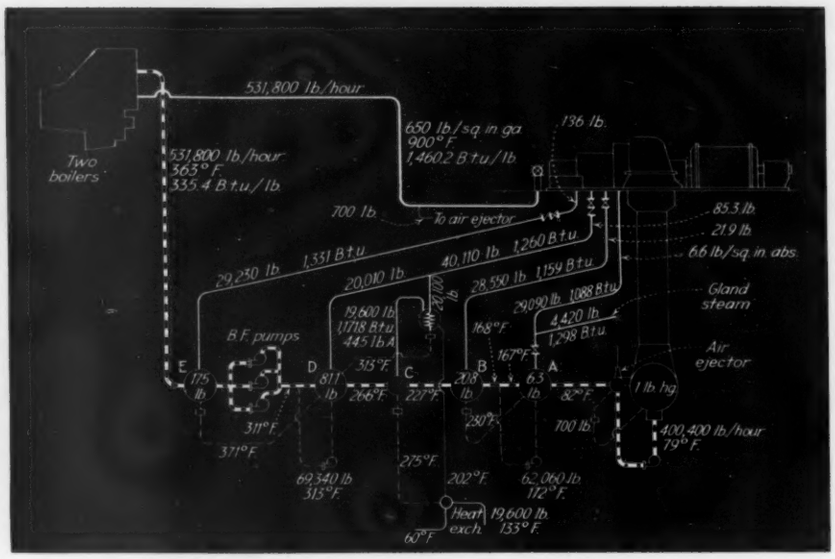
Additional Capacity in Columbia Station

[*Continued from page 39*]

Condenser well, turbine room basement and other vital locations have been protected to a level of 16 ft. above the basement floor, thereby eliminating the possibility of such excessive damage as occurred in the 1937 flood. Emergency pumps are provided at strategic points to remove leakage within protected areas. Certain vital elements of the plant could not be protected by inclosures. As a result, it was necessary to relocate the 2,300-volt auxiliary switching equipment, miscellaneous auxiliary transformers, intake screen controls and coal-handling control equipment at higher elevations.

To insure a supply of coal an emergency loading hopper, fed by a revolving crane mounted on a concrete tower, was built on the present conveyor system; the loading ends of the latter are below the 1937 flood crest. Coal will be brought within range of the crane by a bulldozer operating on the storage pile. An emergency tail pulley is installed below the new hopper. In the event of a high flood the conveyor belt will be cut and respliced to a shorter length to fit the new tail pulley location.

The plant extension for No. 3 unit was constructed to be proof against floods to an elevation 8 ft. in excess of the 1937 flood. The new boiler room has been so constructed that all ash-handling equipment, pulverizers and other boiler auxiliary equipment are located well above the 1937 flood elevation.



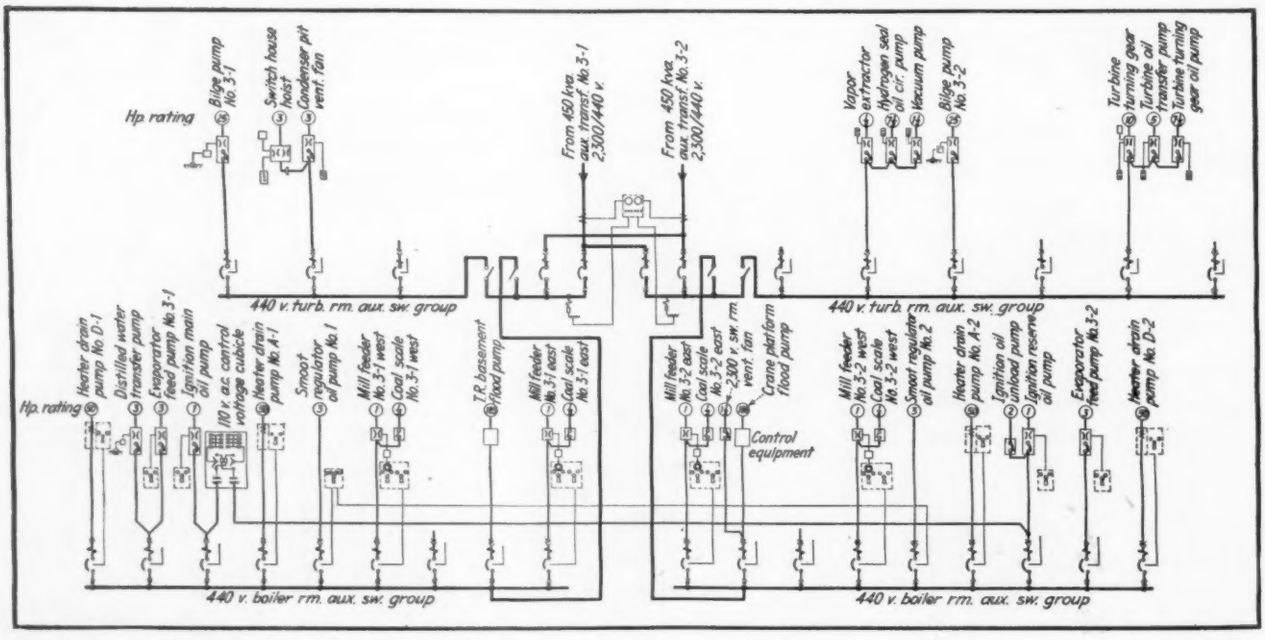
Performance of unit No. 3 with evaporators in operation
Load 65,000 kw. Water rate to throttle 8.182 lb. per kw.-hr. B.t.u. per kw.-hr. to turbine 9,203. Over-all boiler efficiency 87.2 per cent. B.t.u. per kw.-hr. generated 10,554. B.t.u. per kw.-hr. output 11,194. Plant thermal efficiency 28.96.

Sargent & Lundy, Inc., Chicago, designed the plant, under the general supervision of the Columbia Engineering Corporation. Field construction and equipment installation were under the direct supervision of the Columbia Engineering Corporation.

Principal Equipment

Turbo-Generator Unit—General Electric Co., one 27-stage tandem-compound unit; generator rated 65,000 kw., 0.8 p.f., 13,200 volt, three phase, 1,800 r.p.m., hydrogen cooled, with direct-connected 300-kw., 250-volt exciter and 5-kw., 250-volt pilot exciter; turbine capacity is sufficient to generate 81,250 kw.; turbine designed for 650 lb. gage and 900 deg. F. at throttle and 1 in. Hg. Abs. back pressure; high-pressure turbine has sixteen stages and is of the "double-shell" type; low-pressure turbine has eleven stages; extraction for feedwater heating is taken at 10th, 16th, 20th and 23d stages.

Steam-Generating Units—Babcock & Wilcox Co., two units, each rated 350,000 lb. per hour, at 675 lb. gage and 910 deg. F. at superheater outlet; continuous slag tap furnaces; heating surface, 7,176 sq.ft. in boiler and furnace, 15,985 sq.ft. in economizer, 7,980 sq.ft. in superheater; air heater surface, 34,800 sq.ft.; furnace volume, 4,750 cu.ft.; four multiple intertube burners; ignition by kerosene burners set off by electric spark; ignition system interlocked with boiler auxiliaries so that coal


Hp. rating
Bilge pump No. 3-1
Switch house hoist
Condenser pit vent. fan
From 450 kva. aux. transf. No. 3-1 2,300/440 v.
From 450 kva. aux. transf. No. 3-2 2,300/440 v.
Vapor extractor
Hydrogen seal oil circ. pump
Vacuum pump
Bilge pump No. 3-2
Turbine turning gear
Turbine oil transfer pump
Turbine turning gear oil pump
440 v. turb. rm. aux. sw. group
440 v. turb. rm. aux. sw. group
Hp. rating
Heater drain pump No. D-1
Distilled water transfer pump
Evaporator feed pump No. 3-1
Ignition main oil pump
110 v. a.c. control voltage cubicle
Heater drain pump No. A-1
Smoot regulator oil pump No. 1
Mill feeder No. 3-1 west
Coal scale No. 3-1 west
T.R. basement flood pump
Mill feeder No. 3-1 east
Coal scale No. 3-1 east
Mill feeder No. 3-2 east
Coal scale No. 3-2 east
2,300 v. sw. rm. vent. fan
Crane platform flood pump
Control equipment
Mill feeder No. 3-2 west
Coal scale No. 3-2 west
Smoot regulator oil pump No. 2
Heater drain pump No. A-2
Ignition oil unload pump
Ignition reserve oil pump
Evaporator feed pump No. 3-2
Heater drain pump No. D-2
440 v. boiler rm. aux. sw. group
440 v. boiler rm. aux. sw. group

Layout for 440-volt auxiliaries

cannot be fed unless lighters are functioning; two Babcock & Wilcox Co. type "B" pulverizers per boiler, equipped with B. F. Sturtevant Co. blowers; each pulverizer rated 8 tons per hour; coal is dried by supplying heated air to pulverizers, temperature being controlled by manually operated dampers. Each boiler is equipped with fourteen Diamond Power Specialties Co. standard sidewall soot blowers and five rear wall "Clyde" type blowers, 5 Ashcroft safety valves, three on drum, two on superheater outlet; two Diamond bi-color water columns, Smoot Engineering Corp. and Bailey Meter Co. three-element feedwater control; Bailey Meter Co. combustion control.

Electrical Equipment—13.2 Kv Switching Equipment—Westinghouse Electric & Mfg. Co., concrete cell-mounted, separated phase oil circuit breakers.

2,300-Volt Switching Equipment—Westinghouse Electric & Mfg. Co., metal-clad bus and switch structure with removable oil circuit breakers.

Bus Supports—Delta-Star Mfg. Co.

2,300-Volt Auxiliary Transformer—Allis-Chalmers Mfg. Co., one 6,000-kva., three-phase, 13,200/2,300-volt outdoor O.I.S.C.

Auxiliary Transformer Reactors—General Electric Company, three single phase, 300 amp., 13,200 volts, 82.5 kva., 275 reactive volts.

Auxiliary Transformer Disconnects and Potential Transformer Disconnects—Railway & Industrial Engineering Co.

440-Volt Switching Equipment—I-T-E Circuit Breaker Co., metal-clad air circuit breaker bus and switch structure.

440-Volt Auxiliary Transformers—Allis-Chalmers Mfg. Co., six 150-kva., single-phase, 2,400-240/480-volt, outdoor O.I.S.C.

Station Lighting Transformers—Allis-Chalmers Mfg. Co., one 150-kva., single-phase, 2,400-120/240-volt outdoor O.I.S.C.

Control Bench Boards—Westinghouse Electric & Mfg. Co.

Motors—Allis-Chalmers Mfg. Co.

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Union Publishes Paper

Council of the Electric Utility Employees Union of Washington, D. C., has authorized the issuance of a monthly publication entitled "The Reporter." The publication made its first appearance in May. The council has three objectives in authorizing this publication: To stimulate interest in the attendance at all meetings; to bring to each member a brief synopsis of the meetings, and to curtail some of the expenses incurred through direct mail to the officers, representatives and members.

•

Seeks to Increase Output

FPC has granted the application filed by the city of Ketchikan, Alaska, for amendment of license for its hydro-electric power project to provide for certain proposed changes to increase its storage capacity and electric output. The ultimate installed capacity of the project will remain at 4,000 hp.

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The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

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Municipal Plants

BELLEVUE, OHIO—The city has lost its first effort to halt injunction proceedings brought by the Toledo Edison Co. and the Ohio Public Service Co., in which the utilities seek to prevent condemnation and purchase by the municipality of their Bellevue power distribution system. Judge A. V. Jaumann of the Sandusky County Court of Common Pleas sustained contentions of the utilities that the questions involved could be raised only by injunction proceedings. Counsel for Bellevue had maintained that these questions could be adjudicated in the condemnation proceedings previously filed in the Huron County Common Pleas Court by the city. Bellevue is partly located in both counties. Location of municipal offices in Sandusky County made it necessary to file the injunction action in Sandusky County, the court held.

COLUMBUS, OHIO—Suit to enjoin construction of a $1,030,000 municipal light plant addition will be heard on its merits unless the city appeals to the Ohio Supreme Court. By a two-to-one decision, the District Court of Appeals overruled a city demurrer to the suit brought by the Columbus & Southern Ohio Electric Co. to prevent the city from making the municipal light plant improvement voted by the people. The district court reversed an earlier ruling of Franklin County Common Pleas Court and pointed out that in 1933, when the voters approved an $800,000 bond issue for the addition, it required only a majority vote for approval, but at present a 65 per cent majority is necessary for approval. "In our judgment," the decision stated, "the Legislature has not the power to extend the provisions as to limitation when the money necessary to pay those bonds would impose upon the taxpayers a greater burden than is permitted by the constitution. While there is value in providing public works that will give men employment, those who will ultimately pay the bonds have a right to the protection of the constitution." The court did not rule on the question of whether the city had exceeded its bonded indebtedness or had misrepresented its bonded debt. The court sent the case back to the Common Pleas Court for further hearing.

NEWTON FALLS, OHIO—The village has been enjoined from stringing electric wires and erecting poles for the distribution system of its new municipal light and power plant, with the Warren Telephone Co. asserting that poles were improperly placed, of inferior quality, and on the same side of the street as telephone lines. The petition cited the Ohio Public Utilities Commission rules that utilities must co-operate with information and plans where signal lines and supply lines are placed on the same streets or roads. The petition alleged the company had sought plans without success. After four years of planning and nine legal battles in the Ohio Supreme Court and the District of Columbia Appellate Court, the village plans to have its municipal light and power plant and its own distribution system ready for operation about August 15.

NORTH BALTIMORE, OHIO—Special election held in February, at which voters approved by a majority of only ten votes a proposal that the village build a municipal power plant, was held valid by Judge Karl K. Solether in Wood County Common Pleas Court. He ruled there was no evidence of fraud or irregularities, as charged by 25 electors, who are expected to appeal the decision to higher courts. The village is served by the Central Ohio Light & Power Co.

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EDGERTON, WIS.—In a decision denying an application of the Wisconsin Public Service Commission for a rehearing in the utility acquisition case, the state supreme court clarified the statutes as to the time of fixing prices as follows: "This court interprets the statute as requiring just compensation to be fixed as of the time when the commission makes its award. The order (of the commission) therefore, is a failure to comply with the statutory command." Even though possible court appeals may delay a final acquisition in any cases before it, the commission must still fix the value as of the date the award is made, the court held. "The statute in some respects is scarcely workable, but this is as near a workable construction, considering all of its terms, as can be found; at least no more workable one has been pointed out," the memorandum concluded. Although the same question of the proper time for fixing just value is involved in the Cambridge and Adams acquisition cases pending before the high court, the court did not rule on these cases.

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Recent Rate Changes

NEW ORLEANS PUBLIC SERVICE CO., INC., has announced a new electric rate schedule which goes into effect July 1. Mayor Robert S. Maestri stated the schedule will save domestic consumers of New Orleans up to $5 a year. The new set-up brings the rate down from 4½ cents per kilowatt-hour to 4 cents per kilowatt-hour for the small consumer and will result in an approximate total saving of $225,000 for about 90,000 consumers affected. the Mayor said. Under the new rate residential consumers will pay $4.10 for 90 kw.-hr., as compared to $4.50 paid for the same amount under the current rate structure. The difference is in the half-cent reduction on the first 80 kw.-hr. after the first 10. A set fee of 90 cents is charged for the first 10 kw.-hr. A. B. Paterson, president of New Orleans Public Service Inc., expressed pleasure over the amicable understanding reached between the city and his company.

ARIZONA POWER CORP. has announced that it had agreed with the state Corporation Commission to reduce electric rates to make possible an annual saving of approximately $11,000 for consumers in Prescott and vicinity. The reduction, amounting to about 12 per cent, became effective with the first June billings. The rate heretofore has been a minimum of $1 for the first 7 kw.-hr. of energy, 9 cents per kilowatt-hour for the next 93 kw.-hr. and 6 cents per kilowatt-hour for all in excess of 100 kw.-hr. In the new schedule the charge for the first 7 kw.-hr. remains the same; for the next 13 kw.-hr., 9 cents per kilowatt-hour; next 80 kw.-hr., 7 cents per kilowatt-hour; next 200 kw.-hr., 5 cents per kilowatt-hour, and more than 300 kw.-hr., 2½ cents per kilowatt-hour.

PACIFIC GAS & ELECTRIC CO.—Exact nature of rate reductions, effective July 1, affecting every domestic and commercial electric customer served was announced by the California Railroad Commission. Annual savings will amount to $2,200,000. Over the system, customers will enjoy annual reductions as follows: Domestic $723,000, commercial $903,000, street lighting $111,000. In addition, customers in congested areas adjacent to incorporated cities will be saved $251,000, beginning August 1, while miscellaneous reductions total $25,000. In the larger communities around San Francisco Bay, domestic reductions are

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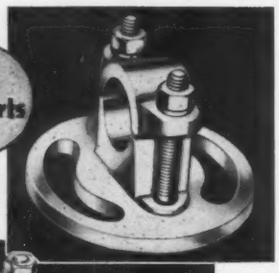

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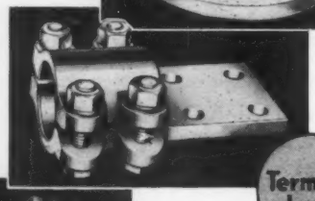

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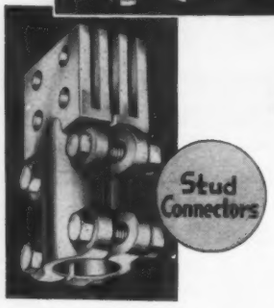

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in the first 35 kw.-hr.—from 3.6 cents to 3.3 cents.

NEW YORK STATE ELECTRIC & GAS CORP.'s proposed change in electric rate schedule which would make a large power and heating rate available for all purposes by any customer guaranteeing a demand for 25 kw. or more has been suspended by the state Public Service Commission. The action by the commission prevents the change from becoming effective pending a hearing and decision by the commission.

CALIFORNIA OREGON POWER CO. has filed new commercial schedules with the Oregon public utilities commissioner reducing its rates by $5,000 a year for 2,500 customers in southern Oregon. The rates became effective June 1.

ELLENVILLE ELECTRIC CO. has filed a general reduction of electric rates with the New York Public Service Commission under which customers of the company will save about $5,187 annually.

HOUSTON LIGHTING & POWER CO. has reduced its electric rates to the approximately 100,000 customers in the Houston area $500,000 annually. The rate reduction, designed to benefit the smaller users of electricity, was made on the first 75 kw.-hr. used. Under the old rate, customers paid 4.8 cents per kilowatt-hour for the first 25 kw.-hr. and 4 cents per kilowatt-hour for the next 50 kw.-hr. with a minimum bill of 50 cents in effect. Under the new schedule the 50-cent minimum bill includes the first 12 kw.-hr. used and 3.9 cents per kilowatt-hour will be charged for the next 63 kw.-hr. used. The rate of 2.5 cents per kilowatt-hour for the next 125 kw.-hr. used and 1.5 cents per kilowatt-hour for the remaining kilowatt-hours remains constant. The rates became effective in June. Rate reductions, ranging from 6.3 to 13.9 per cent, have been extended to the city of Galveston, effective July 15.

ILLINOIS COMMERCE COMMISSION has announced that rate revisions effective during May resulted in an estimated aggregate reduction of $118,972 in annual operating revenues of the utilities of the state. Of this total, $101,673 represents electric reductions.

RICHLAND CENTER, WIS., municipal electric utility has reduced its rates approximately $6,000 annually. Domestic customers will save $3,000; commercial users, $2,020; farm customers, $230, and the remainder will be saved by small and large power users.

BOONVILLE, N. Y., electric plant has filed a revision in electric rates for commercial service with the state Public Service Commission, effective July 20. Reductions will save customers approximately $3,930 annually.

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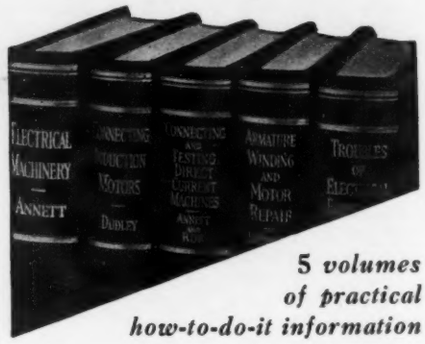
Shipments Advance 125%

Indicating that sales of electric refrigerators are continuing to soar above those of last year, factory shipments of Leonard electric refrigerators in May were 125 per cent of those of the same month of 1938, Ray Legg, Leonard's general sales manager, has announced. Mr. Legg declared that May was the fourth consecutive month of 1939 that saw sales far ahead of those of comparable months of a year ago.

Every phase of electrical maintenance and repair work covered in this NEW Library



5 volumes of practical how-to-do-it information

Every man concerned with the care and repair of electrical machinery should have these practical books, with their helpful tables, diagrams, data, methods and kinks. Every one of the five volumes is jammed to the covers with sound, how-to-do-it information—the kind you have to have when anything goes wrong. Liberal use has been made of practical data and practice in repair shops so as to combine the good features of a library of methods with handbook information covering these methods.

Electrical Maintenance and Repair Library

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These books show you how to

—install all types of motor and generator units;
—locate breaks in armature windings and do a workmanlike job of rewinding;
—know just what is wrong with an electrical machine and take charge of installation and maintenance work;
—making accurate tests of switchboards and apparatus and correctly balance the power with the load;
—handle every sort of wiring job;
—show competence, whether it be in the use of a Stillson wrench or a Wheatstone bridge.

New trouble-shooting book

Now, in addition to four well-known practical books on all details of testing, connecting, rewinding, installing and maintaining electrical machinery, the Library includes Stafford's *Troubles of Electrical Equipment*, a new book full of helpful maintenance information, special trouble-shooting charts, explanation of symptoms and causes of machinery troubles, specific remedies, etc. This revised library gives you the ability to handle bigger jobs with surety of results.

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Electric Pumping for Cost of Coal

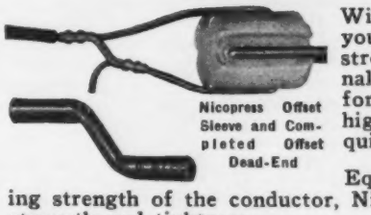
[*Continued from page 43*]

controlled by Cutler-Hammer pressure regulators. The 350-g.p.m. unit cuts in when the system pressure drops to 64 lb. and the 500 unit follows it if the pressure drops to 62. Inversely, the larger unit cuts out when the pressure reaches 70 lb. and the other unit follows at 72. As the rated output of the pumps is at 200-ft. head they are able to deliver 400 and 540 g.p.m. respectively at the head under which they operate.

As the plant would be converted to complete automatic operation with no manual attendance, it was felt desirable to have some means of indication and control located in the city building, which is about 1,500 ft. distant on the opposite side of the river. This was accomplished by installing a four-wire control circuit on the electric company's poles between the city building and the pumping plant, involving a 590-ft. river span. A Republic flow meter is located in the water works office, which gives a complete record of pump operation. A low-voltage relay is also mounted on the meter panel which, in case electric service is interrupted at the pumping plant, will ring a buzzer in the office and a bell in fire department headquarters. There is also a push-button control station mounted on the meter panel by which the larger pump can be started in case of fire without going to the pumping plant.

To insure maximum reliability, the Cincinnati Gas & Electric Company has installed a 13,200-volt, three-phase service for normal operation and a 2,400-volt, three-phase service for emergencies. Step-down transformers reduce the delivery voltage to 240, which enters the building through a 400-amp. fused double-throw safety switch. In case of failure of one source of supply manual operation will transfer all equipment to the alternate source. Cost of electric energy for pumping varies from 1.25 to 1.5 cents per 1,000 gals. Future plans call for the installation of additional pumping units and a softening plant. Up to 1937 the town was unmetered. However, at present it is about 75 per cent metered, and the total installation of approximately 1,050 meters is expected to be completed in 1939.

Be Wise- DEAD-END the *Nicopress* Way



Nicopress Offset Sleeve and Completed Offset Dead-End

With Nicopress Dead-End Sleeves you will speedily and easily make strong, tight, uniform open wire terminals. Also, as these sleeves provide for leaving a tail of desired length, highly efficient line wire taps can be quickly made.

Equalling or exceeding the rated breaking strength of the conductor, Nicopress Dead-Ends have maximum strength and tightness.

Vibration tests, to destruction, have conclusively proven that you will be wise to standardize on the Nicopress method of dead-ending.

Nicopress Dead-End, *for power distribution lines,* are carried in two types—OFFSET and SUSPENSION—and are available for practically all sizes and types of conductors.

Completed Suspension Dead-End

You can't go wrong when you Dead-End with Nicopress. Write today for prices and samples.

THE NATIONAL TELEPHONE SUPPLY COMPANY

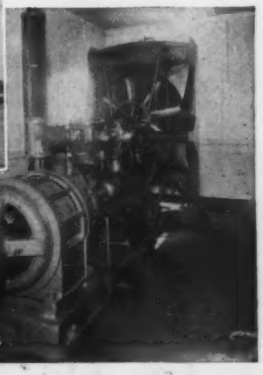
5100 SUPERIOR AVENUE CLEVELAND, OHIO

Canadian Mfr.—N. Slater Co. Ltd., Hamilton, Ontario.

Export Distributor—International Standard Electric Corp., New York, N. Y.

THE GOLDEN GATE BRIDGE — SAN FRANCISCO
TRIBOROUGH BRIDGE — NEW YORK
WELLAND CANAL BRIDGES — 20 — CANADA

The Pennsylvania Railroad Bridges, C. R. R. of N. J. Bridge, the D. L. & W. R. R. Bridges at Newark, the New York State Bridges at Albany, most all of the prominent bridges in the past 20 years have Sterling Engines, either for primary power or emergency.



Cape Cod Canal Bridge at Buzzards Bay, Massachusetts, project of U. S. Engineers, is equipped with 125 K.W. 1200 R.P.M. generator, driven by Sterling Dolphin C 8-cylinder gasoline engine.

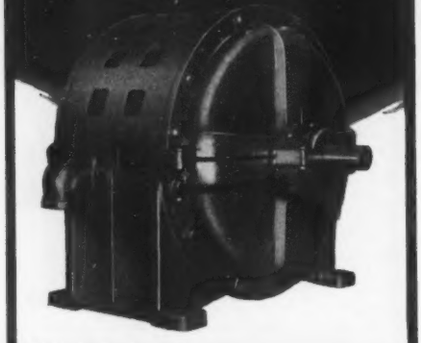
STERLING HIGH DUTY INTERNAL COMBUSTION ENGINES

The accumulated data, covering all details required for a successful installation—yours on request.

STERLING ENGINE COMPANY

Home Office and Plant, 1270 Niagara Street, Buffalo, New York — Dept. C-2 — *Branch Office,* 900 Chrysler Bldg., New York, N. Y.

ELLIOTT MOTORS



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is quite a record for any motor—but is not unusual performance for Elliott motors. Users of these motors expect that kind of performance, and get it because of improved design and high-quality workmanship. • Consider an Elliott motor for your most troublesome drive—get the details. Write us.

L-707

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You can use Everstick Anchors with complete confidence in their holding power—safety and long life. Made of Malleable Iron, built to stand the toughest guying service — known and recommended by leading engineers everywhere.

EVERSTICK ANCHORS...

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Sales Opportunities

KNOXVILLE, TENN.—Director of Purchases, Tennessee Valley Authority, receives bids until July 6 for main power transformers and neutral grounding reactors for switchyard at Hiwassee hydroelectric power plant.

CHESTER, PA.—Scott Paper Co., manufacturer of tissue paper stocks, plans installation of motors and controls, regulators, transformers and accessories, and other equipment in new addition to mill, designed to increase capacity about 10 per cent. A new paper-making machine will be installed. Work will be placed under way at once. Cost about $1,500,000.

LA PORTE CITY, IOWA—City Board of Trustees, F. E. Lehman, chairman, receives bids until July 11 for extensions and improvements in municipal electric power plant, including installation of additional equipment. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

CLEVELAND, OHIO—Cleveland Graphite Bronze Co., 880 East 72d Street, plans installation of motors and controls, regulators, transformers, switchgear, conveyors and other equipment in new plant at former Great Lakes Airport, comprising tract of about 170 acres of land, recently acquired. A number of existing buildings will be remodeled and equipped, and new structures erected, providing about 500,000 square feet of floor space. Proposed to begin work this summer. Cost reported in excess of $1,000,000.

WASHINGTON, D. C.—Bureau of Yards and Docks, Navy Department, has plans under way for a new electric shop building at navy yard, Pearl Harbor, T. H., to cost about $465,000, including equipment. Work will be carried out in connection with two new graving docks and other buildings at same yard; one such dock, for large vessels, is estimated to cost $8,485,000, and other dock unit, for smaller vessels, $2,000,000. Other electrical equipment also will be required for different shop structures, including ordnance shop to cost $165,000; galvanizing shop, $85,000; pipe and copper shop, $150,000; public works shop and storage building, $170,000; and general storehouse building, $750,000. Appropriations have been authorized in amounts noted. Bids are scheduled to be asked soon.

STUART, VA.—Appalachian Electric Power Co., Roanoke, Va., has secured a light and power franchise for period of 30 years at Stuart and will extend lines and facilities for service.

BESSEMER, MICH.—City Council has plans under way and will make call for bids in near future for new municipal electric power plant, following recent decision of Supreme Court authorizing municipality to proceed with project. List of equipment to be installed is being arranged. Financing in amount of $187,500 has been arranged through Federal aid. Ayres, Lewis, Norris & May, Ann Arbor, Mich., are consulting engineers.

BELTSVILLE, MD.—Division of Purchases, Sales and Traffic, Department of Agriculture, Washington, D. C., receives bids until July 7 for electrical and mechanical equipment for center departmental laboratory building at National Agricultural Research Center, now in course of construction, including electric motors and controls, fans, pumps, air compressors, dehumidifier units, preheaters and other equipment (Circular 6341).

OWOSSO, MICH.—Fedders Manufacturing Co., Inc., 57 Tonawanda Street, Buffalo, N. Y., manufacturer of automobile radiators, car heaters and kindred products, plans installation of motors and controls, conveyors, electric hoists and other equipment in new branch plant at Owosso. Work will be placed under way at once. Cost over $200,000. Theodore C. Fedders is vice-president.

NORTH TOWANDA, PA.—Claverack Electric Cooperative, Inc., North Towanda, has made application to State Water and Power Resources Board for permission to construct and operate transmission lines over Susquehanna River, between North Towanda and Wysox Townships, Bradford County, and over North Branch of same river in vicinity of Osterhout, Wyoming County. Extensions will be made in primary and secondary lines in areas noted.

DUMONT, N. J.—Public Service Electric & Gas Co., Newark, N. J., has approved plans for extensions in underground conduit lines on certain streets in downtown district at Dumont. Cost estimated close to $50,000. Work will proceed at once.

BRYAN, OHIO—Village Council is arranging financing in amount of about $150,000 for extensions and improvements in municipal electric light and power plant, including installation of additional equipment. Proposed to make purchases soon.

WASHINGTON, D. C.—Bureau of Supplies and Accounts, Navy Department, Washington, receives bids until July 7 for quantity of automatic telephone equipment for installation at Mare Island, Calif., navy yard (Schedule 6551).

NEW BRUNSWICK, N. J.—Johnson & Johnson, George Street, manufacturer of surgical and pharmaceutical products, plans installation of motors and controls, regulators, conveyors and other equipments in new multi-story plant on site now being selected. Cost estimated about $750,000.

RUSHVILLE, IND.—Board of Public Works, C. B. Jordan, secretary, receives bids until July 6 for extensions and improvements in municipal electric power plant, including installation of equipment, with new cooling tower, combustion control apparatus, panelboard, etc. Entire project will cost about $180,000. Bevington-Williams, Inc., Indiana Pythian Building, Indianapolis, Ind., is consulting engineer.

COLUMBIA, S. C.—South Carolina Rural Electrification Authority, Columbia, has plans maturing for primary and secondary lines for rural electrification in parts of Cherokee, Spartanburg and York Counties, totaling close to 700 miles, with power substation units and service facilities. Cost estimated close to $725,000, of which allotment of $598,000 has been secured recently through Federal aid. Bids are scheduled to be asked soon. J. T. Duckett is director.

INDIANAPOLIS, IND.—Indiana Farm Bureau Co-Operative Association, Inc., 309 West Washington Street, plans installation of motors and controls, conveyors, loaders and other equipment in new plant at Belmont Avenue and State Road for production of commercial fertilizers. Tract of 16 acres of land has been acquired. Cost estimated about $150,000. Work will be placed under way soon.

ROCKPORT, MO.—City Council has plans under way for extensions and improvements in municipal electric power plant, including installation of additional equipment. Estimates of cost are being made. A. Y. Taylor & Company, Central Building, Clayton, Mo., are consulting engineers.

A News Approach to Utility Advertising

[*Continued from page 49*]

Fort Wayne employing local people, portrayed the fact that the company supports local interests with its annual purchases of about $560,000.

In another instance, when the Fort Wayne Central Catholic High School basketball team won the national championship at Chicago, an hour after the game ended the Fort Wayne *Journal-Gazette,* morning newspaper, was "on the street" with the company's congratulatory ads, the only one to appear in the paper the night of the game. The copy had been written and type prepared in advance and in expectation of a victory.

Evening papers on the day of high school graduation carried company advertising headed with a picture of the exercises taken on the same day.

In each of the above cases the *news value* of the advertising brought to the readers' attention the interest of the company in local activities, building and maintenance of good will. By this news approach to advertising the company is educating the public, unconsciously, to watch its advertising for messages of news and educational interest and for comments on local activity.

•

U. S. Rubber Moves Branch

The Detroit sales branch of the United States Rubber Co. and of U. S. Tire Dealers Corp. has moved from its former location on East Jefferson Avenue to 5850 Cass Avenue. All main divisions of the company, including mechanical rubber goods, insulated copper wire and cables and general products, are now located in the new quarters.

HIGH GRADE
HARD PORCELAIN
FOR
Electrical Specialties
High and Low Voltages

IMPERIAL
PORCELAIN WORKS
TRENTON, NEW JERSEY

Safe!

LAST of the ninth with the score tied. "Safe", calls the umpire and the game is ended. That is excitement.

Equally exciting it is when you first use a Tong Test to "umpire" current loads. Safe and accurate, it instantly measures up to 1,000 amperes and, because it contains no windings, cannot burn out.

Tong Test measures both A.C. and D.C. and, with the Voltor attachment, voltages as well. Without obligation, wouldn't you like to have it demonstrated, or a copy of the Tong Test bulletin?

COLUMBIA ELECTRIC MFG. COMPANY
4519 Hamilton Avenue Cleveland, Ohio

TONG TEST AMMETERS

Now Available
on small monthly payments

STANDARD HANDBOOK
FOR
ELECTRICAL ENGINEERS

Editor-in-Chief, Frank F. Fowle, Consulting Engineer — Assisted by 91 specialists

Sixth Edition — 2816 pages

NOW you can start using the Standard Handbook at once—paying in small monthly installments while you use it. No strings to the offer—no mark-up to pay installment charges—no difference in quality of the book. Just a special offer to urge action.

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Converters and Rectifiers
Steam, Gas and Oil Prime Movers
Hydraulic Prime Movers
Power-plant Electrical Equipment
Power Plant Economics
Power Transmission
Power Distribution
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Batteries
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Electron Tubes and Electric Wave Filters
Miscellaneous Electrical Applications

McGRAW-HILL ON-APPROVAL COUPON

McGraw-Hill Book Co., Inc., 330 W. 42d St., New York City

Send Standard Handbook for Electrical Engineers for 10 days' examination on approval. In 10 days I will send $1.00, plus few cents postage, and $2.00 monthly for 3 months, or return the book postpaid. (Postage paid on orders accompanied by remittance of first installment.)

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City and State .....
Position .....
Company .....FW. 7-1-39

G.C.A.
Lamp Replacers
Lamp Base Removers
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We have been making safety tools for 24 years

THE G. C. A. Manufacturing Co.
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"IMPROVED METAL SNATCH"
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"ANVIL BRAND" BLOCK
In Favor With Linesmen

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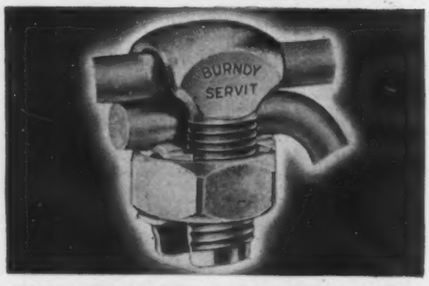
K-P-F

Self-aligning, self-releasing, full-floating, SILVER-PLATED contacts insure permanent ease of operation.

K-P-F ELECTRIC CO.
855 Howard St., San Francisco

BURNDY



SERVIT

Precision Printing Plant Demands Modern Lighting

[*Continued from page 51*]

candescent lamp in a Watkins reflector.

Glare is an even more difficult problem in the average machine shop than it is in the composing rooms. In our machine shops the problem of glare has been eliminated by use of 50-in. Cooper-Hewitt lamps, installed on 10 x 10-ft. centers. One of these lamps is installed over each individual toolmaker's bench, at a hanging height of 9 ft. 6 in.

Synthetic daylight is provided throughout the general office areas by "combination" lamps utilizing mercury-vapor and incandescent light. In the indirect lighting fixtures of spun aluminum reflectors the lamps are spaced on 16-ft. centers throughout the first and second floors. The office units are composed of four 200-watt incandescent lamps in combination with a 400-watt bulb-type mercury lamp known as a Type H mercury lamp. Because these Type H lamps produce twice the light output of equal wattage incandescent lamps, Standard's office lighting is quite economical. The cost of the installation, including wiring and fixtures, did not exceed that of a system designed to use four times as many 300-watt incandescent lamps. The over-all average increase in lighting efficiency is approximately 30 per cent.

•

Quick Delivery of Cord for Squalus Salvage Work

On June 8 an unusually long length of Type S all-rubber cord was needed on the *S.S. Falcon* for use with underwater lights and tools in connection with salvage work on the submarine *Squalus*. E. G. Hall, wiring materials district manager at Boston, working with the General Electric Supply Corp., telephoned the wire and cable section of the company in Bridgeport at 3.30 p.m. A 1,200-ft. length of this cord, or two 600-ft. lengths, was needed immediately.

Even though such lengths are non-stock items, through special arrangements in the factory it was possible to obtain the cord in the desired length. With the co-operation of the American Railway Express Co., the cord was delivered at the Portsmouth, N. H., Navy Yard at 3.37 a.m. of the following morning.

Information Pleas

[*Continued from page 54*]

the tax will be 18 per cent. So $2,700,000 of that $15,000,000 is paid by the government. That makes $5,700,000 all this costs the taxpayers. But wait. If that $15,000,000 were saved by the companies, they would do something with it.

What?

They might reduce rates a little. In which case the consumers are paying for this irritation. Or they might pay it out in higher wages, in which case it is the employees who are paying for it. Or they might pay it out in dividends, in which case Uncle Sam is again contributing, for the dividends would swell every stockholder's personal income tax. And don't forget that a dollar taken off is taken off at the top. It is the dollars paying the highest bracket!

So let's all hope that the Central Statistical Board, set up by President Roosevelt with the avowed and stated object of correcting this absurd situation, will do something about it.

•

Five-Year Program Planned in France

Our French contemporary, *L'Electricien*, reports that by the instructions of the French Ministry of Public Works the French electrical engineering industry is at present engaged on a five-year plan for the extension of the electric power supply facilities of the country. A sum of 3,000,000,000 francs has been earmarked for the work, half of which is to be expended on new power stations and half on the extension of high-tension transmission lines.

The new scheme, which is to be completed by the end of the year 1943, is in addition to two extensive hydro-electric installations at present in course of construction. Including these installations, it is estimated that France will expend a total of more than 5,000,000,000 francs on electrical developments within the next five years.

•

Announce Vacation Period

Vacations with pay for all factory and office employees of the Electric Vacuum Cleaner Co., Cleveland, have been announced. Approximately 1,000 workers are affected. During the vacation period, July 1 to 17, the plant will shut down except for necessary repairs to be made at that time.